Application of technology in business: Developing a Web-Based Real-Estate Information system for the Nigerian Market

A dissertation submitted to the University of Manchester

For the degree of Master of Science

In the Faculty of Engineering and Physical Sciences

2012

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Abstract

On the Pyramid of human survival, shelter (a home) is ranked very highly after food. A home is considered to be a key determinant to human livelihood and buying/renting one is known to be a major and one of the most expensive primary investments an individual makes in a lifetime. The importance of such an investment makes it very necessary to do it right. One approach to doing it right is to improve the procedure of property commerce by applying technology innovations to the real estate business. This is the aim of this work.

The evolution of technology constantly impacts our everyday life as it is being integrated into provision of goods and services. It has been adapted to address a wide range of problems and home buying has not been an exception. However its adaptation in real estate is rather more prominent in developed economies. The economy focused on is the Nigerian (developing) economy. Nigeria as the giant of Africa has a very large population that translates to more lives to protect and hence higher demand for housing. The high housing demand has been recorded to be a resultant of factors such as urbanisation, growth of the mobile population, information availability, accessibility and relative trust and confidence with information gotten from different sources. To implement an efficient technology solution, these factors were examined in order to understand their effect on the market as well as the impact on customer's behaviour. Extensive research was further done on trends that drive the Nigerian market, and the existing technology implementations in real estate. After consulting relevant sources from previous authors and conducting a primary survey, it was discovered that there is an information gap that makes a real estate customer's decision-making process very difficult, time consuming and sometimes expensive. This research addresses the identified information gap in the Nigerian real estate market by providing a turnkey web-based information system that facilitates real estate commerce through information sharing.

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Word Count: 35,727

List of abbreviations

NREI	Nigerian Real Estate Industry
NREM	Nigerian Real Estate Market
NHF-	National Housing Fund
UN	United Nations
US	United States
OFT	Office of Fair Trading
NBS	National Bureau of Statistics
REDAN	Real Estate Developers Association of Nigeria
AGIS	Abuja Geographical Information System
MVC	Model-View- Controller
CBN	Central Bank of Nigeria
NGN	Nigerian Naira
AFDB	African Development Bank
PEST	Political, Economic, Social and Technological Factors
IT	Information Technology
ICT	Information and Communication Technology
E-	Electronic
N	Naira
M	Million
Ms	Miss
LTD	Limited
GDP	Gross Domestic Product
QR	Quick Response
UPC	Universal Product Code
TTOS	Total Time on Site
MOU	Memorandum of Understanding
IMW	Internet Media Works
Ads	Advertisement
DSS	Decision Support Systems
VAT	Value Added Tax
BMC	Business Model Canvas
ROI	Return on Investment
WRI	World Research Institute
IFC	International Finance Corporation
WIPO	World Intellectual Property Organisation
NIESV	Nigerian Institute of Estate Surveyor and Valuers
Esusu	Age Grade Association contributing equal sums of money over a period of time and taking it in turn to receive the proceeds

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Declaration

This is to affirm that the author did this report and the supporting research. Also this report has not been submitted for any other purpose other than this M.Sc. dissertation or in any institution different from the University of Manchester.

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Dedication

This report is dedicated to God who has given me the grace, opportunity, long life, guidance, protection and capability to complete my M.Sc. He is the only reason I am a success today.

I also want to say a big thank you my beloved parents Mr. and Mrs Chukwuemeka, My beloved siblings who provided me with financial, moral and spiritual support during the course of my M.Sc. For all the sacrifices you have made on my behalf, may God continue to reward you all.

To My Home country Nigeria and to Africa: I say better days are ahead

Acknowledgment

I'd like to use this opportunity to recognize everyone who was instrumental to the completion of this Dissertation. To my supervisor Dr. Martin Henery, I want to say a big thank you for the opportunity to be under your tutelage. Also for the guidance wisdom and knowledge I have gathered from you I say a big thank you.

To my lecturers at the University of Manchester, my friends Boniface Atem, Elgar Jenkinson, Tihomir Todorov, Babajide Aroyewun, Bolanle Solomon, Godwin Chukwukelu and Blessing Udoisang in Manchester and Nigeria; this one's for you. If I were to mention names my page count would be outrageous. But you know yourselves and I love you all.

To the Nigerian's at home and abroad who participated in the survey, I want to say a big thank you for your support and honesty; your input was very helpful. Without it, this project would not have been completed. I say to all of you: **GOOD PEOPLE!!! GREAT NATION!!!**

1 Introduction

Interconnectivity became the order of the day over a decade ago, when technology and its capabilities were discovered. Today in our environment, access to and usage of technological facilities occur with so much flexibility that it is beginning to redefine our interaction, with people, business, governments and even our environment. Soumitra Dutta (2012) argued that technology is fast becoming a key resource to boosting economic competitiveness and global wellbeing (INSEAD and WEC 2012). Riggins also stated that recent trends with access to ICT unites the globe for the purpose of communication, transactions, learning and interaction, thereby improving the overall lifestyle of its adopters (Riggins 2005). The author of this work argues in favour of the above adding that the ability to effectively control and utilize technological tools impacts an economy more positively than negatively. The author's position is informed from knowledge gained studying technology as a subject and the extensive research carried out to achieve this work. Knowledge gained, indicates that the value that can be derived from ICT include but is not limited to: simplifying tedious processes, creating new opportunities, exposing better ways of doing things, improving the quality of life whilst increasing our ability to cope with the risk it may pose to an environment or economy. Earlier on, prominent technologies were the radio, TV and the print-media. More recent development of technology, hereafter referred to as ICT (information and communication technology) encompass software, information systems, the internet, mobile phones and computer infrastructure (Apulu and Latham 2009). More modern ICT has been useful for automating processes like information acquisition, resource sharing, data analysis, co-location using spatial data, decision support, social networking, handling and transfer of data between individuals, businesses as well as machines themselves (Wigand et al. 2001).Of interest in this work are ICT and its interaction with businesses and business process. In business, ICT aids cost reduction by automating production processes, marketing, stock control, logistics planning and implementation, record keeping, accounting, and communication (Kotlarsky and Oshri 2005). ICT has also been adopted for more critical business processes like collaboration between distributed systems, environments and individuals working from different locations. The versatility of ICT has also led to its adoption in many businesses including real estate. The adoption of technology to real estate specifically is the focus in this work.

Real estate refers to properties and buildings (Soanes and Stevenson 2008). As an industry[1], the activities carried out are enormous. Activities that occur in the real estate industry can be grouped in 4 main segments: development/construction; raw material provision and distribution; property management and information provision; policy and regulatory practises (Goodman and Thibodeau 2003). As a business, it encompasses management of property assets and activities that monetize such assets (RREEF Research 2010). Real estate has been categorised into two types by virtue of the purpose for which they were developed. The two types of real estate are commercial and residential (Valverde 2009). In this work, focus is placed on residential real estate and surrounding services that fall under the property management and information provision segment of the industry. Under this industry segment the business addressed is information provision. Information provision within the context of this work refers to interconnecting stakeholders in order to enable them share and equip each other with knowledge about properties on the market.

The aim of engaging in the processes involved with selling residential real estate is concluding the sale. Concluding a sale means getting buyers to make commitments either by signing a contract, financial commitments or otherwise. However, getting buyers to commit in order to have a concluded sale can be quite challenging to achieve, especially because it involves a lot of decision-making on the part of the buyer. The difficulty in decision making exist with potential buyers for different reasons, the first of which as observed by Cunningham and White is dissatisfaction either with existing offers or type of information provided about the available offers (Cunningham and White 1974). The understanding gathered from Cunningham and White, is that the availability and reliability of information as well as clarity; trust and confidence in the sources all pose significant threats to the success of the real estate business. The relevance of information provision to purchasing real estate has led to the suggestion of several approaches to address these difficulties surrounding housing purchase. One of the suggested approaches is the application of technology. Real estate type technologies span the use of web-based information systems (websites), quick responses codes (QR), classified ads, Geographical Information System (GIS), Decision Support System (DSS) up to the media. Of interest in this research is the adoption of web based information systems to promote property sales as well as network customers and realtors. Many developed economies have adopted the use of websites as a media for information dissemination to facilitate real estate purchase. Their success has led developing economies to emulate similar

[1]Industry: a collection of activities by different players producing similar goods and services (Soanes & Stevenson 2008)

practice in a bid to enhance the customer's experience and in turn improve the real estate business. In this research, the adoption of websites to enhance the real estate customer's experience and facilitate purchase is investigated with focus on the Nigerian developing economy.

Nigeria like many other developing economies began in 1999 to employ the services that ICT provides in other to improve its economic competitiveness and comfortably feature in the global society (Irefin, I.A. Abdu-Azeez, I.A. Tijani 2012a). Since then the country has undergone tremendous changes positive and negative alike. Technology has been applied in industrial development (supply chain management, scheduling), petroleum production (seismic exploration), agricultural development, and social amenities, facilitating business processes (office tools) and even in real estate (Apulu and Latham 2011). In the NREM, ICT is mainly adopted for property management, advertising and company profiling (A. I. Oni 2010). As expected, there have been numerous successes but also areas of shortcomings that need improvement.

In proposing improvements, successful real estate type technology in developed economies were assessed and restructured to suit the traditional Nigerian Market. To do that effectively however, steps were taken to understand the Nigerian housing market, challenges it is currently facing, what needs exist, what factors when put together impact a consumer's experience and lead up to a closed sale. It was also a priority to explore why the available housing stock has been unsuitable for the customer. At the end of the research, it was discovered that real estate e-commerce, unlike other products, cannot have all processes involved completed over the internet because of issues like security, suitability, trust and confidence, but most importantly fixed location of properties. In spite of this realisation, findings made during the course of this work helped suggest that technology is an effective tool that can be used to overcome these problems and thereby facilitate growth in the market. Examples include simplification of monotonous processes, sorting out the options available to the customer, providing them a feel of the product, and initiating correspondence pending when they make a decision to transact further business physically/off line. In the next section the problem addressed is described.

1.1 Problem Description

Nigeria is a very large country covering an area of approximately 923,768 km^2 which consist of 13,000km^2 and 910,768 km^2 of land mass most of which has been structurally developed. Nigeria is also known to have a very large population. In 2009, Nigeria was the 8th most populated nation in the world (Igbinoba 2009). Nigeria is presently ranked the 7th by the United Nations having an enormous population of over 166 million and account for about 2.4% of the world's population. There is also a Population forecast for 2050 projecting a sizable growth which would mean Nigeria might come-in sixth place (United Nations Department of Economic and Social Affairs 2011). Steady population growth means there will be consistent growth means there will be an increase in the need for housing. Challenges with housing are topics researchers, political participants and the civil society continue to debate. These challenges are pronounced as they reflect in high ratio of occupants per house, shortages in available housing (Gbenga Nubi and Ajoku 2011). The deficit in housing supply exists as a result of several factors, which include high poverty rate in the country; the presence of substandard, non-habitable or in some cases dilapidating buildings. Rapid urbanization, overpopulation, economic growth, affordability of existing houses, wrong type of housing alternatives, land policies, property registration problems, lack of/ poor credit allocation, taxes, high cost of building materials, poor infrastructure, inadequate real estate information systems and the sudden increase in the middle class population have also contributed to the housing deficit (Abiodun 1976). An instance presented by Abiodun on the housing statistics in Lagos indicated overcrowding, he stated that the ratio of rooms to occupants is 1:3.8 and in some cases it goes as high as 1:5. Beyond doubt such phenomenon is problematic.

Although not all of these issues can be addressed, several attempts have been made by political leaders and organizations as well to improve the situation in the Nigerian housing market. Particularly, the Government allocated funds towards housing delivery. Records show that for the period 1975 - 1984, a total sum of N2.5 billion was invested in real estate, while between 1994 and 2001, the sum of N5billion was invested in housing developments (Ademiluyi 2010). These efforts are minimal compared to that of the private sector investments, especially owing to the fact that in recent time, the private sector have spearheaded recent development of housing units in Nigeria (Gbadeyan 2011). Optimist would say that Nigeria has experienced a boom in the real estate market owing to its economic

freedom rating[2] of 80.04% over the past 5 years (Global Property Guide 2012). This raises the question as to why there is still increase in housing deficit.

Comparing the series of attempts made at reducing the shortage in housing stock with the current record of housing deficit, there are some discrepancies. This raises questions, because if a large sum of money from government as well as the private sector is invested in developing houses, why is the housing deficit statistics not reducing? The author believes that the gap lies with information delivery. This opinion is supported by Ms Ama Pepple (the honourable minister for housing and urban development in Nigeria); who remarked that with the agenda of the government to build 1million housing units annually, the deficit level reported of housing stock though not entirely false, is not very accurate (YINKA KOLAWOLE 2011). She stated that two key problems facing the real estate sector are the lack of accurate data about properties available and the inability of already developed properties to cater for the low income earning society. She hoped that a system will be developed that can produce accurate information on the housing units that are being added to the stock. In her speech, she mentioned that if there are one or two bedroom apartments included in the on-going developments, it would help provide for the needs of low income population, assist them in finding properties that are best suited for them and reduce significantly the deficit (YINKA KOLAWOLE 2011).

The understanding from the minister's remarks is that there is a need for an extensive information system. One that is accurate and accessible. There is also a need to find a way by which the already existing properties on the market would cater for the low-income population. These problems are what this research and solution focuses on.

1.2 Motivation for Research

The ultimate goal of a real estate customer is satisfaction from their investment. That is, customers expect that all the attributes they desire will be met within the smallest possible budget. As a result, they try to explore all alternatives to ensure that the property they have chosen is the best fit for them. Some factors that the buyer takes into consideration are depicted in the diagram below.

[2]Economic Freedom: is an index used to measure the existence of an allowance for personal preferences, voluntary exchange, right to invest, compete, and a provision for the protection of persons and property. i.e. Individuals control their time and talent without having any one forcefully demanding, exploiting or fraudulently, seizing what belongs to them(Gwartney & Lawson 2003)

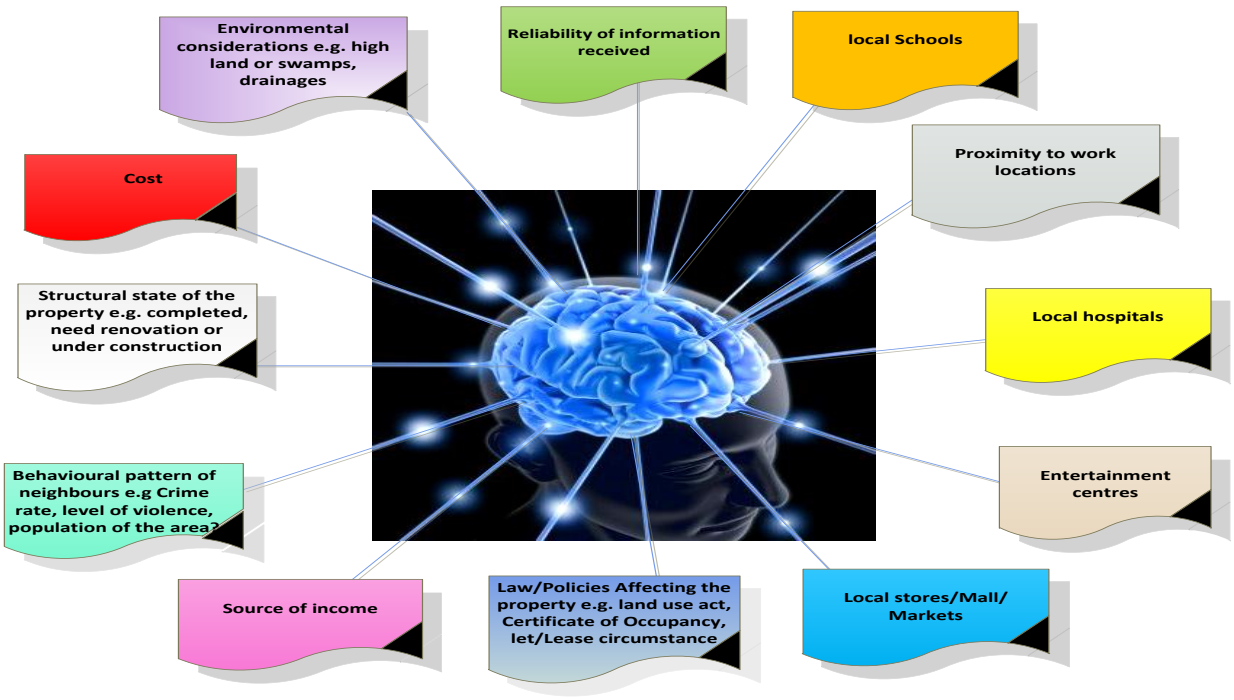

Figure 1-1 Pictorial representation of psychology surrounding property purchase.
The mind of the customer as inspired by (Abiodun 1976)(Arimah 1997)(Ogedengbe 2003)(Bujang 2008)(Bello 2008)

Since the mind of a typical real estate customer has to process all these information while searching through a large number of options. As humans, their cognitive limitation is bound to set in at some point leading up to errors (French et al. 2009), not getting the best deal or even lack of interest and settling for whatever they can find. Alternatives costumers resort to for help in achieving their aim vary. In Nigeria, traditional agents are still the most prominent sources when considering housing (L. ODUWAYE and O. ODUWAYE 2003). Realtor's monopoly on the market results in exploitative fees and in some cases dissatisfactory service delivery. In recent times people are starting to recognize the potentials of technology and embrace it as an alternative.

Research has established that technology has the capability to solve problems as long as it is used properly. Proper usage by implication means that technological systems should be viewed as more capable than a 'Black-Box'[3] (Avison and Elliot 2006). If perceived as a tool that can be taken, contextualized with reasonable innovation; it is more likely that the intended need of the customer will be met with minimal risk (Arnold and Thuriaux 1997).

Were these impressions of technological systems true, the desire of the Nigerian Hon. minister to provide a system that meets the needs of Nigerians by providing a comprehensive list of

[3]Black box: a system whose knowledge perceived is limited to its input, output and transfer behavior. But its internal functionalities remain unknown, ambiguous or vague(Borenstein 2006).

properties on housing stock is not far-fetched. It is for this purpose the author set out to investigate how this tool (technology) can be used to meet the information need in the Nigerian housing market. A more critical approach to providing a solution would require investigation and proposition of business models that make properties already on the market, which were previously unsuitable for the low-income earners more suited for them. Property suitability for low income earners mean scaled down housing options which in turn become cheaper and more affordable.

1.3 Aim and Objectives of Research

The aim of this report is to describe a turnkey technology solution that is able to address the information dissemination and access needs to and for the real estate customer whilst being a stable revenue generator for the controller of the system.

The objectives of the research are: -

- Provide a robust yet reliable information resource that is readily available and highly affordable for a Nigerian real estate customer whilst reducing the cost of getting the information in terms of time and sources.
- Reduce the difficulty associated with property viewing by transferring the process from a physical activity requiring the customer to move around several locations to a virtual activity that can be done from the comfort of their homes over the Internet.
- Identify critical success factors required for a new business to succeed in the NREM and propose a viable business model.
- Optimize the effort of realtors by reducing the time taken to close a deal; enhancing their reputation as well as the number of deals they close in a short period.
- Implement a system that property owners and realtors will consider a very good improvement to information presentation and be prepared to invest in to drive their business success.
- Understand clearly all stakeholder (realtors, property owners, system controllers and the customer) requirements for an information system in the Nigerian real estate business and model it on a portal.

1.4 Questions addressed

In line with the objectives outlined above and within the defined scope; this research will seek to answer questions that include but not limited to: -

- What are the different means through which information is gathered at present in the Nigerian real estate market compared to developed economies?
- How has technology evolved the real estate business?
- Why have the houses on the market not been able to sufficiently serve the Nigerian population?
- What do stakeholders expect from a real estate technology solution?
- How can Nigeria benefit from the advancements made by developed economies?
- Can technology be an effective solution for real estate market even in a developing economy like Nigeria's?
- How can advancements in technology be adopted and integrated with the real estate business whilst ensuring that all stakeholder benefit from the switching systems?
- What measures can be put in place to protect innovation and ensure business continuity?

1.5 Chapter summaries

Chapter 1: the first chapter of this report introduces the topic, outlines the problems identified in the Nigerian real estate market and provides the reader with an understanding of what has motivated this research. It goes on further to outline the aims and the objectives of the research. The questions the research seeks to address are discussed and an insight is given into the artefact that will be developed in the end.

Chapter 2: this chapter covers the literatures reviewed and the findings made whilst carrying out the secondary research. It includes a brief explanation of the factors that have been understood to affect property sales and the difficulties experienced by real estate customers as well as their ability to purchase and the Nigerian real estate market at large. A wholesome analysis is also provided on real estate in Nigeria. The industry, market, the stakeholders and deductions about the NREM are made from the analysis. Some information gathered that were characterized by uncertainty are then outlined for further investigation. Chapter two goes on to

further to analyse findings made in relation to the problem being addressed in order to articulate the best approach to providing a solution.

Chapter 3: discusses the ideas that form the bedrock for proposing a viable business model for the solution. In this chapter the background information recorded in chapters 1 and 2 is used to determine the opportunity in the market, how the business proposed in this work ought to operate and what the critical success factors are. It also discusses what existing business models there are for online platforms and discuses which business models or combinations of models are most suitable for the business. The market is then segmented, a user requirement is drawn up and a business model outlined using the business model canvas. This chapter finishes off by outlining the assumption/hypotheses that where validated during the primary research.

Chapter 4: discusses the primary research carried out. In this chapter the survey design, principles and rational underlying the survey process are discussed. Brief analysis on the questionnaire issued out is also given and the hypotheses they are intended to validate outlined. This chapter continues with report on the results acquired from respondent, analysis of this results and explanation of their implication to this work. This chapter finishes off with an interview narrative and conclusions that were drawn from the primary research procedure.

Chapter 5: after researching, analysing and testing the hypotheses arrived at from chapters 2, 3 and 4. In this chapter the process through which all the information gathered is converted into a software solution is discussed. It covers all implementation procedures starting off from description of the implementation plan, the inception, requirement gathering, execution, and testing phases through to the close out phases. This chapter also reports on the system architecture, development methodologies adopted, the tools used for development. It goes on further to discuss the prototype developed and how information flows through the system and finishes off with a usability testing and reporting of the designed prototype**.**

Chapter 6: summarises this work, stating the achievement made at the end of the research process as well as lessons learned. It discusses the limitations encountered and how they were addressed and finishes-off by providing insight as to what areas the author believes more work can be done.

2 Literature Review

Buying a home is one of the most significant decisions an individual would be required to make during their lifetime (Ogedengbe 2003). Decision is defined as "*intentional choices made by an individual in response to a perceived need*" (French et al. 2009).The psychology that surrounds buying properties bother a lot on decision-making. Wright affirmed this view by stating that making a decision in purchasing/renting a property poses great challenge to a customer (Wright and Rip 2012). R.Valverde also resolved in his study that "*real estate variables are dynamic and time variant"* regardless of the level of maturity of the market economy (Valverde 2009). All of the above bring to knowledge that a criticality to participating in the real estate market is timely and effective decision-making.

With property sales, there are different stakeholders who look forward to making profitable investments with as minimal risk as possible. A seller wants to get the best paying customer and as well the buying customer seeks to get the best deal. It comes as no surprise however that their ability to make effective assessments and come to a decision will greatly increase the potential for each of them to participate in the market. Several attempts have been made in a bid to address this problem. Examples include the works of Vincenzo Del Giudice in 2009 (DSS in real estate for investment choices), Findlay model 2003 (a mathematical model for the assessment of real estate choices) to mention a few. What has been done in this work is to identify what information is required for decision making in the market, and develop an information system that takes information from a user, carries out an assessment on the properties listed in these portal an provides a summary of alternatives which simplifies their decision process. Like with any DSS[4], the suitability of its output is dependent on the information imputed into it.

Any information system is just a series of dormant commands without information. Information/ data fuel the engines for system functionality, hence investigation carried out is reported in the next sections identifying information requirements that exist in the Nigerian real estate market so that they are factored into the solution design (French et al. 2009) if there is any value to be generated to Nigerians who need houses (the Customer).

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[4] Decision support systems are computerized information systems that enable decision makers analyse field data, understand the data, form an opinion and make choices (Marek J. Druzdzel and Roger R.Flynn 2002).

Decision support systems are also defined as systems under the control of one or more decision makers with structured set of tools provided to assist them in the process of decision-making. Such systems are provided to help decision makers understand the problem space, using the information at their disposal (French et al. 2009).

2.1 Housing situation in Nigeria

In Nigeria industrial development, petroleum production, agricultural development, and social amenities have always received attention by incumbent governments but the poor housing situation has been all but ignored until recently (Kundu 1993). Over the past 25 years the issue of housing provision in Nigeria became more prominent as the country's population continued to rise and more people needed to be housed. Its severity led various leadership sectors in the country to prioritise more than usual the issue of housing development. Although attention is now being paid to this issue, the results achieved year over year is still not commensurate with the effort that has been put in place or that was promised to be put in place to combat the problem. Records show that efforts made to address the problem include more research into why the problem existed and increased resource allocation to make up for the inadequacies. However the housing situation in the country continue to experience decline (Kundu 1993). It is for this purpose that Real estate as a business in Nigeria experienced a shift; i.e. ownership, development and sale of properties have been handled by the private sector(Odusote 2008). In recent times the market has received input from more private sector investors; though backed by the Government still, in order to meet up with the demand.

Demand for housing in Nigeria is driven by progressive increase in the middle class (mobile population) (Juma 2011)' (AFDB market brief 2011) resulting in even higher urbanization (Akiyode 2011). Middle class population refers to the fraction of people whose social and monetary status avail them the privilege of a contented lifestyle. They are known to be able to afford a reasonable paying job with security, healthcare, schooling, holidays and a disposable income of between 30% -50%(Kharas 2010). They receive a monthly income between NGN250, 000 – NGN 1 million (approximately £920 - £4,600) (Juma 2011). In Nigeria, they represent a sizable share of the real estate consumer market, as they constantly require an increasing amount of goods and services, thus contributing to economic development. A steady increase in the middle class population results in high rural-urban migration and in turn these people who are migrating have housing needs that ought to be catered for.

Rural-urban migration usually referred to as *Urbanisation*, is a term that stems from "*urban*". This term is used to refer the process of people moving from rural settlements to locations that have the features of cities e.g. carefully planned layouts (United Nations 2005). There has been constant increase in the urban fraction of Nigeria's population as shown in the Figure 2-1 below.

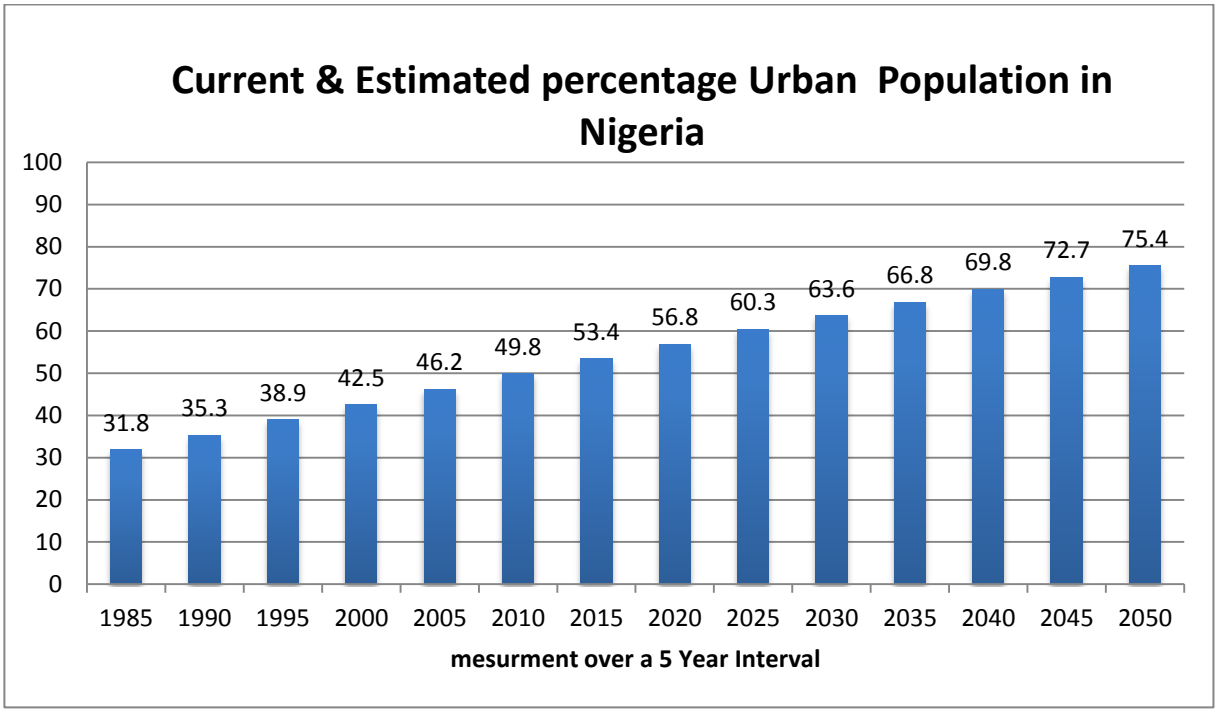


Figure 2-1Percentage of Nigeria's Urban population measured at a 5 year interval

The data presented above show that there is a steady increase in the number of people living in Nigeria's urban cities. This increase is forecasted to continue for a reasonable amount of time leading to an estimated 75% (303 million) by 2050 (Akiyode 2011). More interesting is the fact that the higher percentage of the urban populace is comprised of middle class citizens as recorded by C. Juma. He observed in a survey carried out by Renaissance Capital that the 3 major urban cities in Nigeria; Lagos, Abuja, Port Harcourt and approximately 70% of the population of these cities were of the middle-class (Juma 2011). An interpretation can further be made that although there is a significant increase in the number of people who need urban housing, there is also significant increase in the middle class population hence people are more equipped to afford at the minimum housing that meets their immediate need. This opinion is supported by C. Udechukwu's record on housing ownership as at 2002 in Nigeria. He reported that 87% of Nigerians owned their houses and the renting/purchase was self-funded. 10% of houses were funded by the public-sector, 3% funded by mortgage-banks/firms and the remaining less than one percent by the universal banks (Udechukwu 2008).

Purchasing a property in Nigeria, is referred to as a lease for a stipulated period ranging from; 35, 40, 50, 60, 70 or 99 years, regardless of how it was financed (Abuja Geographical Information Systems 2011). This is the case because when the home is purchased, there is a term known as "Owner-Occupier". This term was used by N.El'Rufai (Former Minister of the

Federal Capital Territory, Abuja, Nigeria) to refer to home owners, as he drew the attention of the general public to the fact that even though they have bought the properties they live in or own; the land on which that property is developed was only issued on a leasehold not freehold. Also in Nigeria, as accorded by the *Land Use Act (1990) Cap.202 (Laws of the Federation of Nigeria)*, land within the province of any state is owned by the state; except land owned by the federal government or its agencies and the right to use such property is conferred on the governor of the state (The Judiciary, Federal Republic of Nigeria 1990). While for a rented/let property, the right of occupancy is subjective as the current owner of the property determines it. Having presented a summary of housing in Nigeria, discoveries made about the market are reported in the next section.

2.2 Real estate Market in Nigeria

NREM can be likened to many other developing countries that face similar challenges of a large population and inadequate stock of houses (Odusote 2008). Evidence can be derived from record of several scholars. B. Kabir *et al*, (2011), reported that in Mabogunje's recent survey, the ratio of available houses in Nigeria was 23 houses per 1000 resident. In 2003, the projected housing deficit was 9.5 million for the year 2010. In 2007, the housing deficit had grown beyond the estimated figure for 2010; the housing shortage as of 2007 was recorded to be 15,000,000, requiring about 12trillion Naira to address it. By 2011, records showed housing deficit to be approximately 16 million (Gbenga Nubi and Ajoku 2011).

Market characteristics

The following are the trends that are currently occurring in the NREM.

- The Government's participation in the development of properties can only account for 4.2% of the housing stock. The larger percentage of properties are developed by the private sector streams, accounting for approximately 90% of urban housing stock (Kabir and Bustani 2011).
- Euromonitor's report recorded that of the Nigerian real estate customer population; 0.4% are home owners with a mortgage, 64.3% are home owners without a mortgage, 21.8% live in rented apartments and 13.6% constitute the other types of housing arrangements (Euromonitor International LTD 2011). See Appendix C for chart representation.
- Rent yields range from 3% to 8% of property cost.

- Property round-trip cost[5] sums up to about 17.75% to 33.5%, which comprise several permits, fees and charges. The most expensive is 8%-20% state government consent fee in addition to the registration fee of 6%, paid by the buyer.
- The maximum 99 years land lease by the federal government
- The non-refundable tenancy fees if a customer decides to terminate the contracts before its duration ends
- Susceptibility of the investors to fraud or even expropriation after a concluded sale.
- In terms of revenue generation, in 2010, real estate revenue experienced a growth rate of 11.22%. By the last quarter of 2011, it dropped to about 11.01% accounting for 1.64 % of the GDP and an overall GDP contribution of 1.79% at the end of the same year (The Presidency 2011).

The blame for the revenue fall was attributed to the lack of financing i.e. although people wanted to buy properties they could not afford to do so (Ndubueze 2009). The government stepped in and made effort to address lack of finance as a deterrent to housing acquisition by providing the National Housing Funds (NHF). This fund was developed to help people achieve their aspirations of owning a home. The NHF fund was available to individuals who earned more than NGN3, 000 per month, to buy properties worth a maximum of NGN5 million. The mortgage was payable at 6% over a period of 30 years according to the NHF Act. Irrespective of the efforts by the government to assist in housing purchase, some reasonable percentage (70% according to the CBN Governor, Governor S.L. Sanusi on live television) of Nigerians still live on or less than $2 per day (below poverty line) and do not qualify for this mortgage. The implication is that, not much difference is expected in the market character between 2011 and 2012. Clearly the lack of finance is an issue for many Nigerians who want to buy properties, but the availability and willingness of different institutions (see Appendix A to provide financing for homebuyers provides acceptable solution.

When an individual qualifies for finance or can finance his housing transaction; the first step taken is acquiring all necessary information about similar properties that suite their need, after which they analyse this information and decide on which property is the most suitable. Presently, when a customer is in need of real estate information, he is required to visit one or more of the following sources as depicted in Figure 2-2.

[5]Round Trip Cost: total cost of buying and reselling residential properties. This includes all charges, and expenses that would be made.(Global Property Guide 2006)

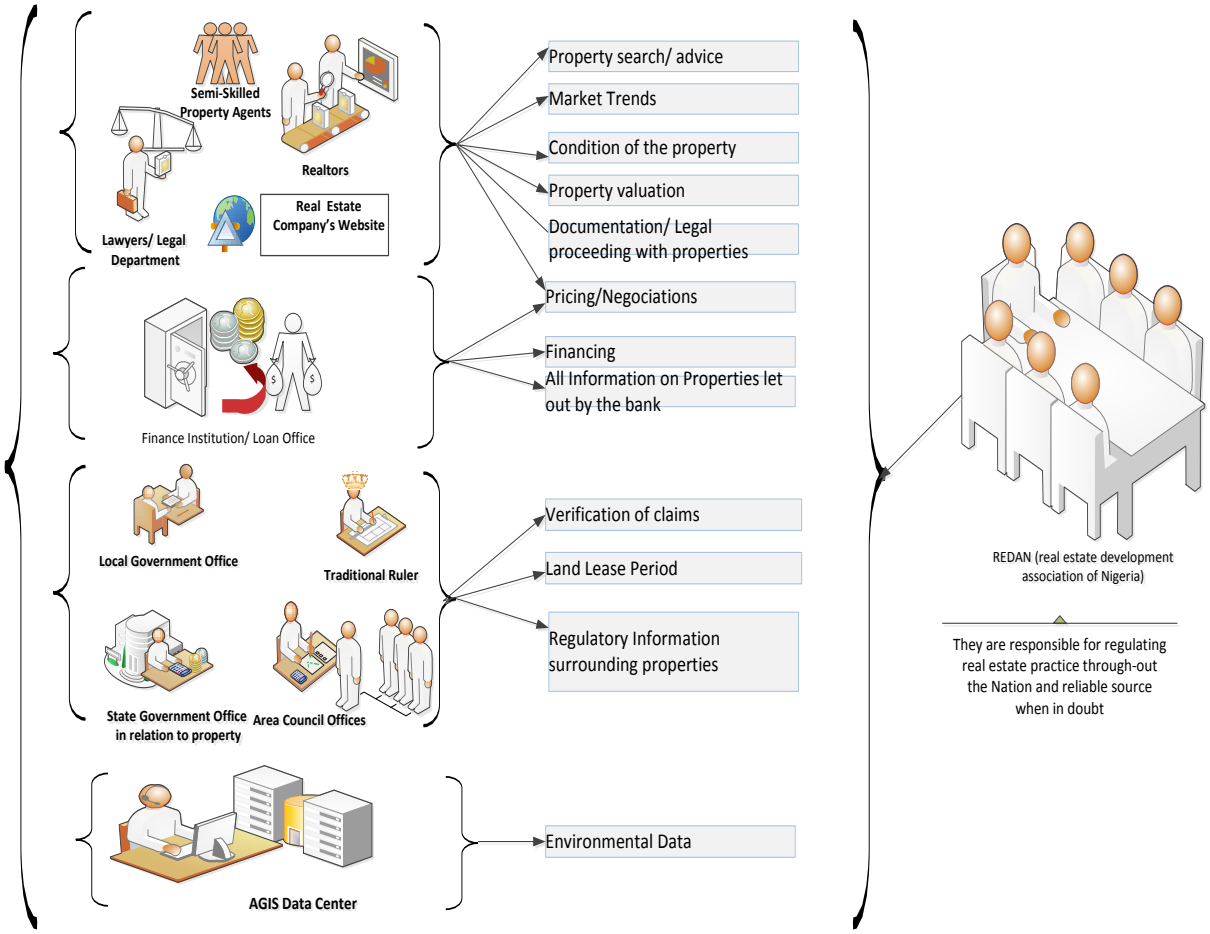


Figure 2-2 Information sources showing the type of information they provide. (Odusote 2008)

The types of information been sought determines who to contact to provide that information. The sources further determine the cost, the validity and claims that can be made by the information seeker. The information gathered range from prices, condition of the property, ownership verification, environmental data, and lease period. See Appendix C for a comparison of sources, the type of information they provide and the needs the information meets. The level of satisfaction gained from the information has been deemed insufficient (A. I. Oni 2010).

A feature of many emerging markets, Nigeria inclusive, is the unavailability of collated data regarding specific sectors. More important is the absence of information regarding the attributes that alter the balance of demand and supply of a market (Kundu 1993). The level of satisfaction with data and information available as perceived by customers is insufficient and this insufficiency is presumed to be because, most of the information available about real estate emanates from participants/players in the sector and estate management firm (Ndubueze 2009). The implication of this decentralised information provision system is that the information provided is usually limited to the projects they are involved with or the properties

they manage. The absence of extensive real estate information reporting can be associated with the fact that the real estate sector in Nigeria is an emerging sector and its structure is still undergoing developmental changes (M. McMillan and D. Rodrik 2011). Regardless of scarcity, the data available has been the bedrock of previous investment as it still is able to give a sense of the market pros and cons to the customer. Thus, shifting the challenge with satisfaction from the information media to the source (real estate agents and agencies). In a survey carried out by Gbadeyan, to measure the difficulties encountered working with real estate agents in one of the Nigerian cities (Akure), it was discovered that their complaints about agents are; disparity in information about the condition of the property leading to "Huge cost of maintaining property (70%); Poor management of property (21%) and lack of up-to-date information about the property (9%)" (Gbadeyan 2011). In digest, it is more likely the challenge with information sources would reflect on the supply chain of the market.

2.2.1 Supply Chain of the NREM

Supply chain is understood to be a collection of players in a particular business segment linked by the flow of information, capital, goods/services, a shared understanding and relationships for the attainment of some goal (Naim and Naylor 1999). Some scholars have described the property supply chain to encompass all functions involved in the business network from integral business processes which include logistics, contractual agreements up until the final goods/service, the closing of the sale and eventual delivery of property package to the hands of the consumer (Youqiyong 2009). A Supply chain model is one that ought to contribute to organisational goals, enhance services to its customer segment, and be flexible to adapt to changes that might occur in the future. It's analysis is essential for making decisions even with property purchase (Jones Lang LaSalle 2008). A.Oni, recorded that, the typical Nigerian real estate market involves three major players Buyer-Intermediary- seller or vice versa (A. Oni 2010). However through interviews with Mr A.Yoloye, manager at Ipali-Harry and Associates and some junior managers from JideTaiwo and Co (Practicing realtors of top estate firms in Nigeria), it was discovered that practising realtors in Nigeria tend to agree with Mr Oni, saying that the product supply-chain of the Nigerian real estate market is in most cases a three-way communication or transaction link of Seller-Intermediaries/Agents-Buyers. In the diagrammatic representation of the understanding gathered, all possible intermediate players in the supply chain of the real estate market have been taken into account.

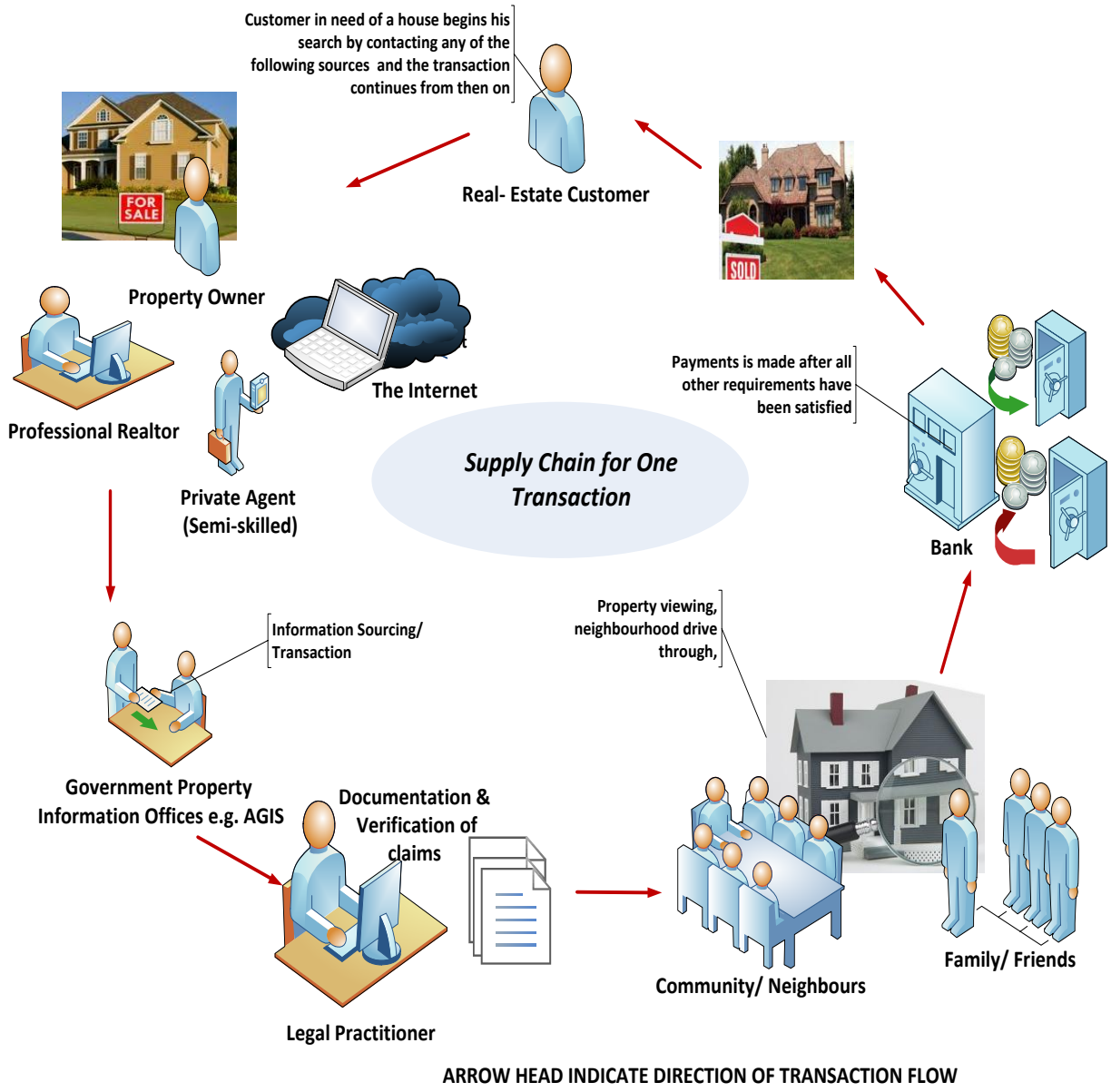


Figure 2-3|| Perceived Supply Chain Diagram of the Nigerian Real Estate Market.

Evidenced from interaction with focus group

The representation of the market supply chain in Figure 2-3 depicts a semi-structured and almost chaotic market space. The intermediary consist of any combination of the following; the property owner, a Semi-skilled agent, a realtor, lawyers, family members, neighbours or property information offices. Regardless of the combination, the supply chain in real estate business is structure deficient. The discourse points out the need for better structure. Further steps were then taken to identify ways in which the NREM have been segmented or is segmented. Findings are reported in the next section

2.2.2 Market Segmentation

Market segmentation is identifying who the right customer is for a product. This building block involves grouping customers into sets that have similar needs (B. J. W. Thomas 2007). It is necessary for effective channelling of strategy and the product to suite the customer(Goodman and Thibodeau 2003). It is usually achieved by subdividing the market using similarities or common characteristics of the customers, demographics, and their product preferences. Basically, in each segment customers share a common characteristic(Jenkins and Mcdonald 1995). Segmenting the NREM required identifying what need exists, who are the people who currently need houses, people buying houses, and people who would readily embrace online solutions for real estate (Odusote 2008). Combining the knowledge gathered from the secondary and primary research, there are several ways in which the market can be segmented and the different approaches were tested. The approaches are presented in Table 2-1 below:

Market segment Approach	**Categories**
Age Range	(15-30) (30-45)(45-60)(above 60)
Family Size	11 and above 8 - 10 5 – 7 2 – 4 1
Family Description	Grand Parents Old Couples Young Couples Newly Married Single
Type of Buyer	1st Time and Repeat buyers
Disposable Income	Small, Intermediate, large, very large
Business Size	(Small Medium or large scale)
Frequency of Home change	Over 10 years Every 6 – 10 years Every 2 – 5 years Every year Unscheduled

Table 2-1 Approaches to Market Segmentation in the NREM (Odusote 2008; Olusesan Ogunyooye 2012)

In the preceding sections, all information gathered on the market is used to conduct an analysis, and the findings reported accordingly. To understand the macro as well as micro environmental variables that have effect on the market, frameworks like the porter's 5 forces and the PEST are used for further analysis. The PEST framework analyses the external forces on the market while the Porter's 5 forces analyses the internal environment. These two

frameworks were selected because together they provide a balanced assessment of the market and provide valuable insights as to how to channel a strategy.

2.2.3 Porter's 5 forces Analysis

The Porter's 5 forces measure five different factors that determine the competitive intensity and viability of a market sector. The factors it measures are competitive rivalry that exists in the market, bargaining power of buyers and sellers, threats posed to new entrants and threats to alternative services. These factors make up the internal environment of a market and are useful in understanding a market space because it puts in perspective their impacts on the industry and brings to knowledge leverages that exist in the market. It also helps forecast the likelihood of business monopoly and how long this advantage will last (Bello 2008) by providing a clear understanding of ways to effectively channel a business strategy and ensure that within speculated time, return on investment would be achieved. Although several problems have been identified in the Nigerian market; it was stated in section 1.1, when defining the problem that our focus was on the information need/provision. As such, the analysis of the environmental variables surrounding the market has been done with a bias to information provision and access in the industry. Figure 2-4 below shows the result of the analysis using the framework.

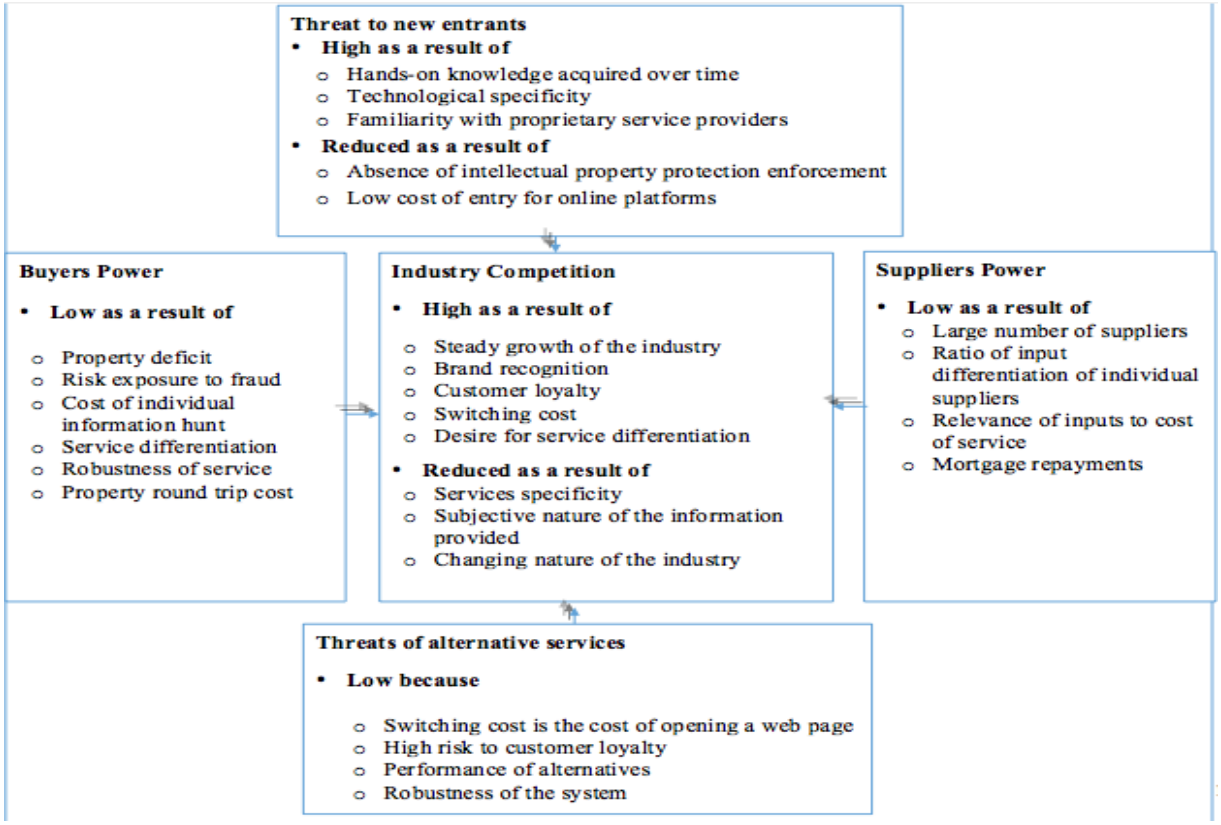


Figure 2-4 Summary of Porter's 5 forces (James Manktelow and Amy Carlson 2012b) (TIM BERRY 2012)

The figure provides a summary of identified internal forces that affect the market. See Appendix B for detailed explanation of the analysis. Assessing the internal forces as has the been done above, the inference that was made was that entering the market as a technology based business that provides information would be a profitable investment both short and long term. Before reaching any conclusion however, steps were taking to assess the external forces that act on the market. This assessment was done using the PEST framework and findings are reported in the next section.

2.2.4 PEST Analysis

The PEST factors unlike the Porter's 5 forces focus on the external macro-environment of the market and outlines the effect the said factors will have on the market as well as opportunities that can be utilised for business advantage (James Manktelow and Amy Carlson 2012a). Factors referred to as external are political, economic, social, technological forces. All these four factors directly or indirectly have an impact on the market. Further discussion is provided as to how they have affected the market in the past and what opportunities exist in the future.

Political

- Government Policies
- Leadership hierarchy of the area where the property is domicile
- Political in/stability
- Property procurement laws
- Copyright Laws
- Land Lease period

Economic

- Unemployment
- High round-trip cost of properties
- Inflation Rates
- Level of economic freedom/ economic freedom rating
- Percentage fees for realtor/middle agents
- Consumers disposable income

Social

- Demographical change in home buyers
- Technology dependency
- Overall trust and confidence
- Networking both at business and individual level
- Environmental perception
- Media

Technological

- Innovation in use of technology tools
- Government focus on technology and its adoption
- Power consumption and cost
- Speed of adoption of technology solutions
- Availability of Internet facility
- Information security

Figure 2-5 Pest Analysis of NREM

Detailed explanation of the different factors and how they impact the market are presented in Appendix B. Nonetheless in summary, it was discovered that the political factor poses the highest risk in the market. This is so because they were identified to introduce very high uncertainty, as they are majorly laws or organizational cultures. As a result not much can be done about them in this work. The economic and social factors however provide opportunities that if utilised, will make up for risk posed by the political factors. The social and economic factors ensure consistent market activity and as such would be profitable for the business and the industry at large. The technological factors however, like the political pose risk to the industry, however this risk is more severe with business that operates core technology driven procedures. It was identified that the government of Nigeria has embarked on a series of projects to improve technology adoption in Nigeria. Thus promising a better future for online business platforms and mitigating other identified technological factors. Some other difficulties that exist under technological factors like information security are also addressed in this work. Having summarised the PEST factors that impact the market, progress was made to outline the challenges these factors introduce to the market i.e. external as well as internal variables.

2.2.5 Challenges faced in the Nigerian Real Estate Market

The Nigerian real estate market can be described to possess dogged characteristics. This is the case because it continues to undergo pressure from numerous sources ranging from politicisation to other civil influences without caving-in completely. Reviewing the work of other authors, it was discovered that information availability has been a challenge, and when offered, the customer's information is subjective (Economic Comisssion of Africa 2008). That is the scope and quality of the information gotten is dependent on the source and in turn constrained, either to how much knowledge the source has or his business handlings. This diff whether the source is a real estate organization, a company website, an individual realtor or in more informal situations a family, friend or a Semi-skilled realtor. When it's a government agency/organization the information gathered though valid is very expensive. Hence, a customer's search to find properties that suite their need is constrained, time consuming, expensive or limited and prone to misguidance. Also, when a customer seeks to gain as much information from a combination of different sources it is very expensive (Whitehead et al. 2009). This subjective limitation does not necessarily allow the customer get the best deal on properties, as customers do not want to travel long distances to view properties when they have not decided on buying. On the other hand looking at relocation to new cities; a customers

would naturally want to have made their arrangements about where to live from their present location before relocating.

A second problem, identified is that a property available might be suitable for a customer but either above their budget, or caters for more than is needed. A typical example will be a single middle class/income person searching for a place to live, although he can afford the property, he does not necessarily need a 3 or 4 bedroom duplex. Another would be that if offered the opportunity; (i.e. if properties were sub-let) a low-income earner might be able to afford a fraction of the property previously considered unsuitable because of his budget. Thirdly, taking a look at property owners and the realtors, a concluded sale greatly depends on pitching to the right customer. However the avenues through which they promote their product is as important. If they are only able to transact business within their local community or already existing client relationships, a limitation to their customer scope is introduced and in turn will affect how often they make a sale and how good a deal they get on their properties.

Next in line on the pressure ladder is legislation. In 1978, the Land Use Act was enacted (further amended in 1990) transferring ownership of land to the government. The consequence of this law was that it became more difficult to acquire land for property development and even when successful the land was only issued out on a lease for specific period of time (The Judiciary Federal Republic of Nigeria 1990). This is a big challenge because if it truly lies in the hands of the private parastatals to revive the housing system, a secure investment atmosphere must be provided.

Also there is the challenge of time required for property registration. In accordance with the World Bank report as on property registration, in the year 2004, Nigeria was one of the five most difficult countries where you can register your property (World Bank 2007). In effect, it used to take about 21 procedures in 274. It not was until recently that Nigeria became one of the top reformers reducing the time to 80days. Even the 80days is still a stretch when considering a business timeline; especially since there are countries like New Zealand, which carry out similar activity in a day. There is also the cost incurred when registering a property, which was 27% of the properties worth. This figure however does not account for compensation that had to be given especially when you needed to acquire the consent of a governor.

Another challenge is the absence of a nationwide credit database enabling institution that offer credit services to make accurate lending decisions. Information withholding is a character that

should be avoided in Nigeria if the economy is to grow steadily across all sectors and reduce the occurrence of fraudulent lending or borrowing schemes (Obi 2006). Akeju, mentioned of having read about attempt of nine Nigerian banks to institute a national credit database in collaboration with '*Dunn and Bradstreet'* (Akeju 2007). Till date there has been no further mention of such scheme. The impact of the absence of a credit database posed even greater risk to the market as many credit institutions have their resources tied up in several projects usually initiated by the same group of people and as a result they are unable to issue further credit facility to honest investors. Malize, reported that Nigerian banks during the real estate boom offered credit facility worth over 700million trapped in real estate building and these funds have not yet been recovered either as a result of them not being completed, overpriced or in some cases the loans are taken by corrupt citizens who use them for their immediate personal benefit (Malize 2012).

There is also the issue of taxation. At various levels in housing development VAT payment is applicable. This becomes a problem in the long run as it contributes to price hikes at the end of the supply chain. When viewed wholesomely, value added tax amounts to about 35 % of the value of the property. And investors are still charged for registration and stamp-duties. Other issues that were discovered include the high cost of building materials. Following the barn of on importation of certain goods into Nigeria in a bid to encourage indigenous industries, some materials needed for property development were affected. An example is cement. Cement account for relatively half of the materials used for property development in Nigeria. Since this indigenous companies that produce these materials are few and still developing both in their skill set and acquisition of supporting resources, the price of cement has increased by over 200% from the year 1999 (Nwaolisa 2012). Poor amenities have also posed challenges to the real estate market as the value of properties is reduced significantly or in some cases interest in the property is lost as a result of poor social amenities like access roads, water, electricity, proper drainages etc. Poor amenities force houses to be offered at much lower prices than they are worth because the comparative cost of making alternative arrangement to this effect is high.

Finally, in section 2.2.10, the barrier to ICT adoption was discussed. These barriers constitute challenges introduced as a result of the technological factors. A summary of all the above challenges is provided in Table **2-2** below and attempts that have been made to resolve or in most cases address the situation are reported alongside.

Challenge	Attempts made to confront it
Land Use Act 1990	In 2007, Late president Musa Yar'adua announced that this law would be amended improving investment opportunity by providing easier access to land. 9 other similar bills were presented before the legislative house but unfortunately were not eventually passed pending the end of term in office.
Property Registration	The implementation of structured systems like AGIS in Abuja and similar system in Lagos with the sole purposes of handling land and property registration, verification and appropriate documentation (Abuja Geographical Information Systems 2011). These institutions have successfully automated the registration process improving efficiency for investors.
Credit Database	Proposed development by collaboration between '*Dunn, Bradstreet'* and some banks which to the best of our knowledge is yet to succeed.
Taxes	No record of effort to combat taxes where discovered during the research.
High Cost of Building Materials	Although Importation Barn was proposed In 2003, there continued to be an imbalance of demand over supply and the date of enactment was continuously postponed. Following the growth of the local market, The President, His Excellency Goodluck Jonathan while commissioning the Ewekoro cement factory in Ogun state, said that the barn will be re-enacted in 2012 (Austin Imhonele et al 2011).
Poor Infrastructure	Governments have made efforts towards infrastructure provision some of which include the development of RIDS (rural infrastructure development scheme) a subsidiary of NAPEP (National poverty eradication program (United Nations 2002)
Suitability of houses for the Low-income population	The development of 1 and 2 bedroom flats as part of the housing development scheme.
Information Provision	State specific systems such as the AGIS in Abuja and the property management system in Lagos. There have also been small-scale solution from businesses such as portal but there is yet to be a unanimous platform where everyone is able to exchange information. This unanimous platform is what this work provides.

Table 2-2 Summary of Challenges faced in the Nigerian Real estate Market and Corrective Attempts

Knowing the challenges that exist in the market, it was necessary to identify "*who*" was having these problems, what level of impact it had on them and what appetite parties concerned have to resolve the issues. The next section discuses the finding on the people or business affected by these challenges.

2.2.6 Analysis of Stakeholders

Stakeholders of a business or in an industry refer to people who perform one function or the other that impact the business or that the business impacts. During the research into the market, 3 key stakeholder categories identified to be the most affected by the problem being

addressed and required a solution to the problem. The stakeholders are buyers, sellers and realtors. A further analysis is done on each stakeholder category to identify their key needs and how best they can be addressed.

- **Buyers: -** this category of stakeholders refer to people who are in need of properties, they range from new buyers i.e. people who are recently climbing unto the housing ladder, people who are already on this ladder but they need to find another home either because their situation has changed, the family size has changed, their income has changed or/and they are starting a new job in a new location. They also encompass people seeking a retirement home, a second home, tourist or organisation that provide accommodation to their staff, and investors who are into buying and reselling properties.

- **Sellers: -** this category of stakeholders refers to people who provide the services that are offered to the buyers (Proost 2010). Services they provide include houses, rooms and land. This category encompasses private property owners, real estate developers, and investors. Under this category there are other players like the government who develop properties, travel agencies/ tour operators who have properties or are in partnerships with property owners. Finance institutions (banks, insurance companies and other credit providers) that provide credit facilities for particular properties either owned by them or people they represent. These customer segment need to showcase their properties in the best possible way and to as many buyers as possible so that they can conclude their sale
- **Realtors: -**these categories of stakeholders are people who have the responsibility to connect buyers to sellers. They understand the market dynamics by virtue of training or experience and as a result they are entrusted with property management functions. In some cases they are also responsible for maintaining the property and charge a percentage off the value of the properties they handle. They are also responsible for managing relationships between both parties. They serve as an intermediary or a mediator between the buyer and the seller. This category encompasses trained real estate agents, a semi-skilled agent, in some cases lawyers. Lawyers acting, as realtors in addition to the basic function offered by a traditional realtor are usually concerned with verification and validation of claims, hence would find the system reduces the complexity surrounding their job with regard to property purchases as well as sale.

2.2.7 Key Needs of the stakeholders

As can be inferred from section 2.2.6, the different stakeholder categories have different types of needs and different appetites for having them achieved. It is also the case that they have different abilities to pay in order for their needs to be met (Proost 2010). A summary of the need identified for each stakeholder category is provided in Table **2-3** below.

Stakeholders	**Summary of their needs**
Buyers	• Buyers desire as much information about properties as they can get From facilities, environmental and demographics(Bujang 2008). • Buyers also need to find properties that are suitable for them (Office of Fair Trading 2010). • Buyers desire Cost effective property search (O. Olatoye 2011). • Buyers want to know what is happening in the market, trends and rates (CABE 2011) • They want to network conveniently (O. Olatoye 2011). This is the case especially when dealing with a first time buyer. • Some buyers require credit facilities to enable the purchase properties (Moss 2003). • Customers desire to ascertain legitimacy of properties, their owners and realtors (Odusote 2008).
Sellers	• One of the key needs of a seller is to sell to the highest bidder. • Sellers want their properties to be able to reach the largest possible number of customers (Proost 2010). • Sellers always want to make sure at the end of a transaction they have a reasonable profit margin (World Bant and IFC 2011) (Agbolade 2011). • Seller would like to Reduction in the number of middle men (Ojikutu et al. 2012). • They desire to be abreast with occurrences in the market (CABE 2011).
Realtors	• Realtors a more often than not interested in closing a sale (Odusote 2008). • Realtors want to maintain a positive business relationship (O. Olatoye 2011). • Realtors need to build a good reputation (Bello 2008).

Table 2-3 Summary of Stakeholders needs

The need identified in the user segments have been listed and analysed properly. More detailed description of the stakeholders' needs is provided in Appendix E. In developing the first prototype, attempt is made to meet most of the needs of each stakeholder categories. Needs not successfully met at these phase will be inculcated in the subsequent versions. If implementing a web portal would meet the needs of the different stakeholders, it is however

evident that there is a need to look at existing portals and identify what can be done differently and what gaps can be filled.

2.2.8 Opportunities and Threats in the NREM

Chapters 1 and preceding section of chapter 2, established that there is very high demand for houses in Nigeria. There is also a very high shortage in the housing stock. More disturbing is the knowledge that this demand is forecast to grow significantly over time with population increase, urbanisation trends, economic growth, the availability of financing and the influx of investors. According to (Akeju 2007) the Nigerian housing market has tremendous opportunities which are waiting to be tapped and Government alone cannot fill the housing gap. Improvements made with housing delivery is still insufficient as only 1/3rd of the Nigerian population now live in urban houses, even though the average number of people per home is still 5 (ERSO Expert Meeting Stockholm 2008). Although there has been an improvement, the facts that about 2/3rd of the country's population (111 million people) still do not have access to habitable housing still raises course for concern. From the works reviewed on the market, the following are the opportunities and threats perceived in the market.

Opportunities	**Threats**
There is relatively high economic freedom which serves as an attraction for investors in the market	There is a lack of structure in the supply-chain
Policy makers and parastatals are currently making efforts to provide structure and improve the status of the market	Properties are advertised or put up for sale in a one-dimensional fashion 1.e a customer must be able to pay for the whole property before the transaction can fall through.
Sellers are willing to expand their customer reach, but lack the technological skill	There is inadequate information on the housing stock
There is still an untapped, unsaturated market as approximately 2/3 of Nigeria population are yet to gain access to urban housing.	Most of the online interfaces that exist are semi-functional (they are live interfaces on the internet but do not necessarily provide the services promised)
The market shows potential for growth, especially with on-going efforts to breach the gap created by the housing deficit	The lack of a unanimous platform for property listing makes business offering restricted to what each company has been hired to manage
There are a lot of properties that are yet to be accounted for or pitched to the customer	

Table 2-4 Strengths and weaknesses of the NREM

In the Nigerian Market, several issues have been identified. Also these issues have been investigated to see what impact they have on the market, the solutions that exist at present, the opportunities they create and the risk surrounding them. An example of solution discovered is technology. The advent of technology and its adoption to addressing real life problems, reinstate the confidence that the issues in the Nigerian real estate market have great potential for being addressed by a technology-based solution. To proceed, a look at is taken the real estate market in cyber-space.

2.2.9 Adoption of technology in real estate globally and in Nigeria

In comparison to other online businesses, online real estate transactions start on the Internet but almost never terminate online because of the peculiarity of the products/services offered. Another reason is the transaction size and its relativity to the life of the individual (Office of Fair Trading 2004). However beginning the purchase procedure online is a significant aspect of the business since the most difficult aspect of real estate business is searching through large pool of alternatives, getting required information and finding what to buy/rent. This significant problem is what the online interfaces address (Burrows & Ellison 2005). They do this by making it easier for customers to carry out searches, compare results and build relationship amongst stakeholders using the information systems. In many developed economies the use of the Internet, as a property information and transaction source has been a successful venture. Case in point, in the US with its reputation of high internet usage and 69% of users being adults (Burrows & Ellison 2005); a survey carried out by the National Association for Realtors (NAR), indicated that of the home purchases that had been recorded, 87% of buyers used the internet as a source of information. 1/3 of respondents also claimed to have come across the home they purchased through an online medium (Marketting Charts 2008). In the UK, also 58.5% of adults have been reported to use the internet (Burrows & Ellison 2005). Realtors and property owners have taken advantage of the increased use of the Internet, to create an interface for their business. This venture has been profitable following findings in the survey carried out by the Office of Fair Trade (OFT). Their survey report show that of recent property purchases, 37% of the respondents used the internet as a tool to finding their property of choice; with 9% claiming to have found the property they eventually purchased (Marketting Charts 2008).

Nigeria, adopting the use of technology began to develop property website where property information were published. Some of these are www.jidetaiwoandco.com, www.ip4properties.com, and www.nigerianpropertiesonline.com. Though a welcome initiative

since the sector is opening its doors to the international market, the information provided by these websites is usually limited to the realtors direct business (Odusote 2008). Also consumers have in the past been dissatisfied with the reliability of the information as well as the scope (Gbadeyan 2011). This has been the case because these websites basically serve to advertise the agency, its businesses, and other service offering that they provide their client base. Most companies develop a website mainly for the purpose of company profiling and in some cases because it is believed that having a web-presence is a symbol of keeping abreast with technological innovations. The majority though have failed to effectively serve the customers' needs. Reason for such occurrence include developmental failure, change in managements priority, a promise of service that is left unfulfilled; typical examples will be availability of link that do not work, links to pages that do not exist leading to eventual distrust in online channels as a source of real estate information. There are also some agents and individuals as well who post listings on their Facebook pages or on other social networking sites like twitter, LinkedIn. Extensive record has not been made on these technology options owing to the absence of a structure and consistency when such media is used. The above mentioned are the two types of technology systems being adapted to the real estate market.

2.2.10 Barriers to ICT Adoption

Regardless of the benefits and opportunities that ICT adoption promises, there are still issues that restrain people from properly investing in and using ICT systems. Authors argue that most developing economies are plagued with problems that hinder the full adoption of ICT infrastructure. Some of such issues have been identified in the Nigerian economy and would be highlighted in this report.

Issues identified that contribute to poor usage of ICT facilities in Nigeria include high cost of implementation. This is the case especially when ICT is required as an enabler and not the main business of the organisation (Apulu & Latham 2009). Organisations shift focus from ICT when they discover its cost; this eventually leads to reluctance to invest in ICT. Other issues are lack of familiarity with the capabilities that lie with ICT systems (Apulu & Latham 2009), Inadequacy of skill and training (Solomon 2011), and cultural restrictions. As defined by Irefin et al, there are cultures in Nigeria that are not yet open to learning and information/resource sharing (Irefin, I.A. Abdu-Azeez, I.A. Tijani 2012b). Another identified issue is inadequate policies and frameworks governing the use of ICT. Even though there have been frameworks developed for governing ICT in Nigeria such as NITDA in 2002, NOTAP, FMIC, they have failed to properly enforce these policy/frameworks (Apulu & Latham 2011).

Exploitation and fraud; the inability to properly implement security systems for ICT leaves room for exploitation and in turn discourages its usage. Personal characteristics; Costello et al argued that adoption greatly depend on the individual and the concept of personal benefit. i.e. and individuals enthusiasm for technology determine to a large extent his ability to invest, use and be innovative with ICT infrastructure (COSTELLO 2009). Poor service delivery levels provided by prior implementers leading to preference for more traditional approaches.

All the above issues have been known to challenge proper adoption and utilization of technology in Nigeria, some more than others owing to the severity of their implication to a business processes. With real estate however, it is the opinion that not all these factors have severe impact on the market. Limitations that are more likely to occur in the Nigerian real estate market with respect to ICT are Poor skill set, poor service delivered by prior implementers, lack of familiarity with the capabilities ICT avails a business and cost implication of acquiring and/or managing ICT systems. It is worthy of note that these issues may also exist in similar industries in developed economies. It was then necessary to investigate and find out if these issues were peculiar to the Nigerian real estate market, and if not what has been done in more developed economies to address them. Steps were further taken to investigate real estate market of a developed economy to understand how the market operates, its peculiarities but most importantly investigation is carried out to identify lessons can be learned from similar markets in already developed economies.

2.3 Real Estate Market in a Developed economy – Case Example UK

The UK residential property market boast of three main types of residential tenure, they are the owner occupier, private renting and the social renting (Pattison & Vine 2010). The mix in tenure has evolved over time. Pattison & Vine reported that whilst in the pre-1979 era, owner occupation and social renting were more prominent, by post 1979 up until late 2000; the ratio of owner occupation increased. Private renting only became prominent at about 1995 (Pattison & Vine 2010). OFT's housing survey results show that between 2007- 2008; there were 22.2 million total households in England. 70% were owner occupiers, 18% were social renters and 13% were private renters (Office of National Statistics 2008). By 2009 the tenure mix changed slightly recording 67.9% owner-occupiers, 17.7% social renters; and 14.4% private renters making for a total of 21.5 million households in England between 2008 and 2009 (Office of National Statistics 2010). These data indicate that the property market mix is

currently experiencing a turnaround of events. Private renting is experiencing growth as the sector recorded an increase of 1million households from 2005-2009 while other sectors are shrinking gradually (Pattison & Vine 2010). By 2010 housing stock grew to 22.4 million houses with 66% owner occupied, 17% the private rented and 17%vsocial rented (Department for Communities and Local Government 2011).

An insight provided by the office of fair trade show that in the first quarter of 2009 there were 859,000 residential transactions, which was a slight reduction from 900,000, the year before (2008) and significant decline from 1,600,000 in the year 2007. In the last two quarters of the year 2009, however the market started to experience some growth (Office of Fair Trading 2010). One major factor identified to be responsible for the wobbly market trend is affordability (National Housing and Planning Advice Unit 2010; Whitehead et al. 2009). In the UK affordable housing is defined as properties that are accessible by individuals, that meet the needs of the entire house-hold and which do not cost higher than 35% of the total house-hold disposable income (Housing Division 2007). Affordability of properties have also been ambiguously described as relativity of the housing cost to the income level and other factors specific to the household or tenant segment (Wilson 2006). Regardless of what definition is of preference, uniform is the perception that the affordability of properties on the market affects the activity or growth of the market (House of Commons 2006).In addition to affordability, there are several other factors that affect the state of the UK housing market some of which include an imbalance in favour of demand between housing demand and supply (Stephens 2011), suitability, inappropriate location, the wrong size (one bedroom unit available when family homes are in demand) (Whitehead et al. 2009), construction measures, funding ,the planning framework (Wilson 2006), investors attitude in response to economic changes of an area and changes in asset allocation from pension funds (Fabozzi & Shiller 2010). There has also been record of impact from demographic or economic changes (Palmer et al. 2006), changes in the population, housing information availability, household profiles, income, jobs, the desire for a second home, the availability of vacant properties, ease of access, and school areas.

Since information provision is the focal point of this work, identified sources of real estate information in the UK include but are not limited to newspapers, realtors/lawyer, and property centres or for sale signs. By 2004, the office of fair trade after a market study reported that consumers were dissatisfied with the level of service as well as the cost of these service

provided them by the real estate agents (Office of Fair Trading 2010). Over the next 5 years (2004-2009) there were several improvements. See Appendix D for improvement made.

During these five-year period, the use of the Internet and other technology based information media became more prominent to help improve or broaden as some may view it, the service quality, cost and alternatives in the property market. According to the OFT, these web portals served as "*enhanced shop windows*" as opposed to entirely replacing the agents who still dictate the market till today (Office of Fair Trading 2010). In the past the agents were the platform while the property buyer and seller were on either side of the platform. In present times, web portals now serve as these platform whilst the 2 customer segments are the agents and buyers on either side (BRISTOWS 2012). One of the first real estate web portals (rightmove.co.uk) to be introduced in the market started in 2000 and today it continues to dominate the online real estate market space accounting for a market share of over fifty percent. It has also been rated to have the highest customer traffic and highest TTOS (total time on site: total time a customer spends on a site looking for houses). Zoopla.co.uk, which started in 2009, comes in 2nd place, findaproperty.co.uk in third place and primelocation.com in 4th place. Today, web portals have become a mainstay in the UK property market (Grainger Plc 2012). Many buyers use the Internet to search for properties and about 40% of agents reported that 50% of their transaction leads were initiated from web portals. There also exists usage of classified ads for property listing. Examples include www.guntree.co.uk, www.spareroom.co.uk. A very interesting trend is the use of QR (quick- response) codes, which originated from Japan. These codes are now being used for mobile information dissemination. QR codes are similar to the UPC barcodes used in stores for product identification, except that they are 2-dimensional, they can store comparatively large amount of data and they are able to serve as links to web pages. QR codes are being attached to "for sale" signs in the UK (Chautin 2011), such that if a customer is in transit and comes in contact with an advertisement that is of interest to him, using a smart phone he can scan the code to view relevant information about the property (Soon 2010). Supporting web portals are web-based agents. The introduction of web based agents not only reduced the cost of hiring traditional agents, but they also have the capability to make low impact decisions for the buyer. In essence they relieve some of the pressure posed to the buyer by making some of the decision for them and reducing their alternatives to a manageable size. It is worthy of note however that, like with other online services, there exist still the problem of trust and confidence. See Appendix D for more detailed explanation of the different types of real estate technologies in the UK.

2.4 Summary

The UK real estate market is one that is vast, the players in this market vary and most of all it has undergone several developmental phases which has led to it being dependant on the right information and timing. The UK real estate market has seen the economic bubble in 1999-2001, 2009 and it has still managed to recover relatively. As has been evidenced, it is a very active market fuelled by innovation, different applications of technological systems/practices, changing demographics, policies; yet, it has managed to remain structured and highly regulated. These entire characteristics make it suited to serve an enormous range of customers regardless of if they are present in the same town, city, country or even continent.

> **Case in point**: - The influx of international migrants into the country. When people are considering migration, they are able to go online, search for properties, be able to decided reasonably if they are interested, contact the realtors in charge, make a notification of interest. In some cases they are able to put down a deposit payment reserving the property. All of this is made possible because of the structure of the market, trust and confidence in information sources and proper exploitation of technology trends.

In comparison with the Nigerian market however, Background discussions show properties are growing increasingly, and there is continuous increase in population indicating that more people would need houses. Characteristics such as an increase in the mobile population; means more people can now afford to buy properties. And yet the market is experiencing a downturn in revenue generation. There is therefore an observable discrepancy as to why this is the case. Previous scholars have raised the issue of availability and access to financing. Acceptable attempts have been made in a bid to addressing the finance problem yet there is no significant change in revenue generation. Another issue that has been raised is lack of affordable housing. The government, public and private sector have made attempts, to provide affordable housing. Still O.Ogunyooye reported that, the majority of transactions over the years in the property market have been carried out by people who earn a minimum of $4 per day (above poverty line). This means that only a very small fraction of Nigeria's population have participated in the real estate market. The implication is that the Nigerian market is viable even though not yet technologically mature. This resolve is supported by the projection for 2012, that real estate transaction in Nigeria is still promising, as 70% population are yet to participate in the market.

A positive trend occurring in the market that provides some room for these other 70% to participate is the production of low income properties to cater for the massive market of low income population segment (Olusesan Ogunyooye 2012).

One issue that has not been carefully looked into however, and is a key factor if the international customer segment and the other 70% of the Nigerian population are to participate in the market is the issue of unanimous and universally accessible information systems. This problem creates a business opportunity, one in which technology advances can be adopted to proffer solution to. This issue in addition to all others discussed previously would also be used as baseline knowledge for development of a business model for the solution. The next chapter discusses the proposed business model for the solution

3 Business Development

A thorough understanding has been gathered on the NREM and similar markets in developed economies. The NREM was analysed, several opportunities highlighted and one opportunity was selected. The opportunity selected was the provision of a technology-based business whose core function was to provide an information system were stakeholders could share information more effectively and within budget. The first step to utilizing the opportunity identified was outlining a user requirement. From the analysis provided in chapter 2, the perceived user requirements are outlined below.

3.1 User Requirements

Having identified our users in stakeholders in section 2.2.6, and further analysed the need they have presently in the industry in section 2.2.7, the author goes on further to piece these information together into a user requirement specification needed to develop a business plan. For the portal, buying customers' requirements are summarised in Table 3-1below.

REQUIREMENTS	Compulsory	Essential	Bonus
Flexibility with search criteria		☑	
Speed/response time	☑		
Ease of navigation	☑		
Brief registration form	☑		
Security		☑	
Mapping	☑		
Seller type specification		☑	
Universal Access	☑		
Realtors Profile	☑		
Search Facility	☑		
Saved Searches	☑		
Library of Images		☑	
Sorting Function	☑		
E-mail Agent/Facility		☑	☑
E-mail follow-up		☑	
Easy Navigation	☑		
Absence of clutter	☑		
Flexible Property Type		☑	
Request for property		☑	
Outline of available facilities in the property	☑		
Advertisements			☑

Table 3-1 User requirement specification table

Explanations as to what each requirements means is further presented.

List 3-1 User requirement outline

1. **Flexibility and ability to vary search criteria: -** it has been discovered users want to be able to vary their search criteria in other to see all the alternatives open to them. Search criteria should include the location of the property, the price, a properties co-location to basic infrastructure such as school, malls, market and entertainment centres
2. **Speed/Response Time: -** the time taken to obtain information that has been requested has been a challenge. Therefore users would like to have information accessible. Also they desire that the cost be reduced, if possible eliminated. Especially because the loyalty online customers has been known to be dependent on the amount of time it takes to click the mouse (Yang & Peterson 2004). Which translates to time it takes to get a response for a transaction. As such they desire very fast refresh rate for pages/link/data they are viewing.
3. **Ease of navigation**: - users require that links should be function and navigation flexible i.e. they do no need to reiterate all the step that have gone through to reach a particular page. They want to be able to go from the page there on to the next one without hitches.
4. **Brief registration forms**: - online customers dislike long forms as they can be cognitively demanding and time consuming. As such a form must be concise, objective and relevant to the user.
5. **Security/ Data confidentiality: -**in accordance with the business model, buying customers get information at no cost because in return they give out their information for business intelligence. However users desire that the portal is in compliance with data protection act and IT security standards. That way they feel safe using the portal and have the confidence that their information will not be misused.
6. **Mapping**: mapping is a feature that allows the user to view on a map the area in which the property being considered or advertised is located. Several portals adopt different logics to mapping. Some portals indicate the exact location of the property and others indicate relative location (E.g. Street, landmarks etc.). The differential in mapping schemes is as a result of choice or area addressing constraints.
7. **Seller Type Specification**: specifying the seller type allows the user to anticipate what cost implication there might be if they are interested in a property. This is the case because properties sold be realtors always includes a commission whilst with a landlord there is more likelihood of the absence of hidden charges.

8. **Universal access**: - this is a feature that transcends a portal from the basic company profiling system to a system that is accessible and more relevant to a wider range of stakeholders. This could include realtors, individuals, public and private players alike. Basically anyone who wanted to sell/rent out a property.
9. **Realtors Profile**: this feature enables users gain some perspective on the personality of the owner/seller whose properties they are interested in. It is useful in that, it builds trust and confidence necessary for the continuation of transactions.
10. **Search Facility:** this is a feature that users use to select from all listings the properties that suite them. Its dynamism is of essence as users are more comfortable if they are able to manipulate the search to produce different results.
11. **Saved Searches:** this is a feature with which, users save properties they are interested in as they looks through all the available alternatives. Users are then able to return to it at a convenient time without having to re-iterate the process. This feature is beneficial because it prevents users from carrying out the same activity repeatedly and in turn they are more inclined to use the services provided by the portal.
12. **Library of Images**: this feature eliminates some difficulty associated with transacting real estate business as a virtual/online trade. A purchase never concludes online because customers need to physically see the property, have it feel right and most importantly because a purchase is not easily reversible. The use of images has been known to aid these problem as reported by Carlton Seminars & Co (Carlton Seminars 2011). The presence of a series of images showing property features is very useful because it helps customers to be able to relate to the property. It also aids decision-making and creates some sense of familiarity when they eventually go on a viewing. All of the above contribute significantly to closing the sale.
13. **Sorting function**: - the capability to sort results either by price, location, type, for sale, to rent, number of bedrooms etc. is a function that users find to be very helpful because it helps eliminate or in some cases postpone coming in contact with listings that are irrelevant to them. Irrelevance in this case might arise from the fact that although the property is suitable based on their search criteria it is above their budget, not in the right community of not the right type of property.
14. **E-Mail agent**: this is a feature put in place such that when a customer is interested in an advertisement posted, whether to buy a property or sell a property, the originator of such advert can be contacted within the same platform without having to run an extra program or visit a different website.

15. **E-Mail follow-up: -**this feature is one that enables sellers respond to customers who have put forward a request or contacted an agent about a property.
16. **Easy Navigation**: - ease of navigation is a primary requirement for web-portals especially with real estate business. Ease of navigation is necessary so that users do not have to surf through large number of pages before they gain access to the particular page or information, which they seek.
17. **Absence of Clutter: -** the intricacy of real estate business makes it necessary to avoid clutter when displaying or disseminating information. This is even more necessary on online scenarios because it would make information easier to grasp, provide clear understanding of what is expected from interested customer, scale down the number of properties individuals indicate interest in and help them decide if the description is suitable for them. Another up side of avoiding clutter on property portals is that from understanding gained the number of irrelevant/misguided clients the realtor will have to deal with is reduced.
18. **Flexible Property Type: -** this feature allows sellers to specify exactly what type of properties they have to sell/rent out. Some portals although provide universal access, they are restrictive in the type of properties they allow for listing. Example would be a seller who has a room to rent out and the portal only allows for full property listings. Another example would be sellers/realtors who have properties for rent and the portal only allows 'for sale' properties.
19. **Request for Property:-** this is a feature that allows customers put in a request for the type of property desired. This is necessary because after a customer has searched all through the properties available, they may all be unsuitable for him. Putting forward a request ensures that whenever similar property/listing is available the user is contacted.
20. **Outline of facilities available:-** a feature provided to enable seller tell buyers what facilities are already present in the property. It is useful so that the buyers knows first-hand what he/she is dealing with and is not met with surprises when they eventually visit the property.

Selling customers user requirement are the same as the buying customer except that they in addition would require

1. **Property listing**: selling customers require user-friendly interfaces where they can post their listing i.e. they need not be technically savvy individuals to use the system efficiently.

2. **Realtor's profile/portfolio**: -secure access to their portfolio on the content management system. This is necessary to ensure that all information is correct and have emanated from the appropriate source. It is also a necessity for non-repudiation.
3. **Connectivity to other businesses**: selling customers also desire to be able to benefit business interconnectivity from using the system. They want to foster good business relationships and as such require system integrity to ensure that as much as is possible businesses are legitimate.
4. **Data access for business intelligence**: - businesses desire to be able to retrieve data from the system for business intelligence. They want to be able to gain customers perspective on their listings and the listings of competitors as well.

Having specified the user requirement, progress was made to propose a viable business model using these requirements. Developing this business requires that the business model be first defined (Innovation Mini Series 2012). However proposing a business model also requires that an organization understands what competition they are up against in the market they intend to go into (Eriksson & K. Thomas. 2007). In proposing a viable business model, plausible competitors were analysed to see how well they have performed and what areas they of need they are yet to address. This analysis was useful to extrapolate what the best entrance point for the business that attempts to provide a solution utilizing the opportunity identified in the market was. Analysis the existing portals are also necessary to create a market niche for the business ensuring competitive advantage

3.2 Analysis of Potential Competitors- (Web-Portals)

Online businesses are known to have relatively low barriers to entry. The resultant of this somewhat positive characteristic is that the market becomes saturated and highly competitive (Johnson 2010) (Miller 2007) (Finkelstein 2001). In Nigeria however, the Internet and web-based businesses are still in a near-prominence phase hence indicating that the market is not yet saturated. There are few functional real estate portals in Nigeria some of which pose significant competition to the proposed solution. The following portals represent some of the key competitors identified in the Nigerian real estate market: castlesweekly.com, www.ip4properties.com, nigeriapropertycentre.com, propertiesng.com, naijaproperties.com, and www.axorahomes.com. To do a comparison between these competitors and the proposed solution, a benchmark for measurement would first be derived. This benchmark would be generated from and integration of the key features present amongst real estate portals and key features that are offered by our solution as outlined in List 3-1. Benchmark features are:

- Mapping
- Seller type specification
- Universal Access
- Realtors Profile
- Search Facility
- Saved Searches
- Library of Images
- Sorting Function
- E-mail Agent
- E-mail follow-up
- Easy Navigation
- Absence of clutter
- Flexible Property Type
- Request for property
- Outline of available facilities in the property

Having outlined our benchmark for measurement, they are further used in assessing potential competition in the market. 5 competitors (websites) were selected and the result of the assessments depicted in Table 3-2. A range 1-5 was also used for the assessment (1 = absent, 2 = undecided due to access limitation, 3 = present but inactive, 4 = present and active but not easily accessible, 5 = present and active) and the performance of each web-portal calculated.

S/N	Criteria	Castlesweekly.com	Ip4properties.com	Nigeriapropertycentre.com	Propertiesng.com	Naijaproperties.com	Axorahomes.com
1	Mapping	1	1	5	1	1	1
2	Seller type specification	1	1	2	4	1	1
3	Universal Access	2	1	5	5	1	3
4	Realtors Profile	3	3	1	1	1	1
5	Search Facility	5	2	4	5	5	1
6	Saved Searches	1	5	1	4	1	2
7	Library of Images	2	3	5	5	3	1
8	Sorting Function	1	2	4	3	1	3
9	E-mail Agent	5	1	4	4	5	1
10	E-mail follow-up	1	1	1	4	5	2
11	Easy Navigation	4	5	5	4	2	5
12	Absence of clutter	1	4	4	3	2	2
13	Flexible Property Type	3	4	4	2	1	4
14	Request for property	1	1	4	2	2	1
15	Outline of available facilities in the property	1	1	1	1	1	1
		32	**35**	**50**	**48**	**32**	**29**

Table 3-2 Results of competitor Analysis

From our results inference can be made that **nigeriapropertycentre.com** performed the best overall, with **propertiesng.com** following in 2nd place and **ip4properties.com** in 3rd place. Presently these three web-portals represent the most effective and efficient portal in Nigeria. However there were still some places/gaps that were discovered in their service offering. A more critical look at benchmarks and the ratings attached show that two main areas where portals in Nigeria are lacking is in the use of geo-location information (mapping systems) and in providing information on the facilities available in a property. Other areas that have somewhat poor performance include the provision for customers to make request for notification if a property suitable for them comes on the market, e-mail follow up when their request has been attended to and finally specifying whether the property been viewed were enlisted by a private seller or agents. The solution has been developed to properly address all these identified gaps in order to provide reasonable edge/chances of competing in the Nigerian Property market. In addition, web-portals allow for the implantation of several business models and can accommodate switching with minimal effect making them properly suited for the Nigerian market.

3.3 The Opportunity

When analysing the need of stakeholders, and competitors in the market; it was realized that in addition to the information gap on the housing stock on the market already discussed which the main focus of this work is. There are other information problems that exist with customers. 2 of such problems were successfully identified and they are:

- Properties suitability as a result of the social and environmental characteristics,
- Properties suitability as a result of the right type of housing and

Customers in the past have preferred traditional processes of gathering real estate information because online platforms only advertise properties without providing information on other factors that surround the properties(UN HABITAT 2012). Customers indicate interest in a property, when they eventually see it they discover that it is not suitable for them. Social and environmental information refer to water supply, local stores, market, transportation, entertainments centres, and the neighbourhood characteristics.

Another type of information need identified is with the housing options provided. There are customers who are more concerned about the type of housing offered on online platforms being suitable for them. Using traditional sources of housing information, people who do not have families are able to find more suitable houses. An example would be young professional

or students who need to find shared properties in an area, although the location and all other surrounding factors of the house are suitable, they are unable to progress with transactions because they are required to be interested in buying/renting the whole property before they can proceed (UN HABITAT 2012).

Conclusively, the opportunity identified was that there is a need for an online real estate platform that is extensive enough to account for all the properties available on the market regardless of what state or area where the property is located, who owns or has been hired to manage it. It would also be very useful if this system would be able to provide social and environmental data on the properties. Finally if this solution would be extensive enough to cater for the different types of customers on the market it would need to provide a platform for people with more flexible housing options to participate in the real estate e-commerce community. Flexible in this case means provision for people want to sublet individual rooms in their properties to get across to their customer types and vice versa. Also people who want to take up properties available for shared-renting can advertise for interested parties, specify what kind of people they will prefer to live with and buddy-up. This opportunity identified drives our approach to implementing technology in business. Our solution provision in response to these need are discussed in the next section.

3.4 The Solution

The product developed is a web portal. The portal has being designed to provide service to both private property owners and realtors (individual or organisation). The goal of the product is to as much as possible make the search experience of the online real estate customer effective, enjoyable, relaxed, simple and productive. This goal has been put in perspective and measures to attain the desired results have been factored into the design. These measures include provision of an intuitive user interface, convenient search tools, modern features and relevant neighbourhood demographics. The product was also designed to provide merged business platform for people who have listings to sell or rent while enjoying huge savings compared to existing solutions on the market. The stakeholders have been defined; their requirements have been specified. The web portal was developed to address difficulties experience by customers and other dependencies in the NREM. It was being designed as a robust online solution; it has been tailored to accommodate the customer segment that is less technologically savvy as well as the reasonably exposed client base. Customer friendly interfaces that have been provided to enable users vary their search criteria without being

exposed to the underlying procedures or encountering difficulties and still get their expected result.

The product will be interfacing with frameworks, IDEs such as the Code Igniter, Google Maps V3 API to provide information, retrieve data, manipulate data, analyse and draw conclusions. It also has component that takes care of some business needs such as customer data acquisition for effective CRM (customer relationship management), business networking, as well as collection of data for business intelligence. By design, this solution addresses information provision more than it focuses on revenue generation. Since some customer segments are not required to make payments for services they get (searching for information). Development focused on building a system that addresses the information need first. The system will be maintained with revenue generated from the customer segments that use the service to promote their own businesses. The type of data the system will be dealing with include user names, date of birth, occupation, address, property address, property type, type of lease, geographical information of listings, snap shots of property posted. Deliverables expected include full functioning website, a dashboard component, property listing portal, documentation, access credentials. The product will serve its customers by providing several functionalities as will be outlined below. It is worthy of note however that some features are customer specific and as such they are regulated for integrity and confidentiality purposes. The functionalities provided below.

List 3-2 Functionalities provided by the solution

1. **Information Display portal**: this is a component of the system where information will be displayed. It can be manipulated forms available to the user. The customer will be provided with the flexibility of using these forms to vary the information that is displayed to suit his preferences.
2. **Realtor Membership system:** a membership system is one where realtors and real estate organisation can register, have their service rated, and have remarks/feedback posted on their profile. It also makes it possible for businesses to connect with each other. The customer is also able to gain some perspective on a realtor and decide whether to hire such person for a job.
3. **Property listing database:** this is a robust database component that is managed by the selling customer. Each customer registers and gains secure access credentials to access the property listening component. Using this component they are able to update

properties as they become available. They are also provided with the capability to manipulate the content they have posted

4. **Property package:** this is a feature that comprises forms and information a user will require if he desires to proceed in the investigation into specific properties. These include contact details of personnel in charge of the property, form indication interest to begin purchase procedure and a detailed documentation of the property stating all the issues that need to be taken into consideration. When a user completes the package provided him by this feature, e-mail is automatically sent to the realtor who posted the listing.
5. **User membership:** the user membership is a feature provided to users after they have indicated interest in a property. In order for buying customers to gain access to the property package or contact details, they will be required to enter registration details. Upon entry of the registration details a profile is created for the user so that he can log in at any time and manage his/her profile or save searches or comment on services received.
6. **Saved searches:** this is a component that enables users to save searches as they are carried out, such that if they need to sign off and return to it later, they would not need to repeat the searches again. They can then retrieve their previous searches and proceed from there. They also have the capability to send listings to their family, friends and/or lawyers in order to gain their opinion.
7. **Property choice:** the property choice component is a buyer-oriented service that allows the customer input the specification for their properties of choice. Entering such preferences into the information system enable them to get notification when there is a listing that matches their preferences on the market. Also seller customer can contact the user and discuss adjustment if necessary.

Building a system that will provide the above functionalities posed some challenges specifically because there were different user segments with different requirements. To overcome these challenges, an approach was adopted. These approach was to define at least one value that would be generated for each user category and use it as a specification for the minimum viable product[6] which is developed as the first working prototype in this work. The value generated for each user segment is reported on in the next section whilst defining the business model.

[6] Minimum viable product refers to the minimum set of features that can be developed sent out into the market and get feedback from early users as quick as possible. Using this approach ensure that you achieve big projects in small increments and the target customers help fill in the missing gaps. “Development with a direction” (Eric Ries 2012)

3.5 Business Model

A business model is a plan on how an organization creates value, both for the business sustainability and it client base. This view is supported by P.Weill et al (2005), defining a business model as a plan on what a company does and how it makes money doing what it does ((Weill et al. 2005). Since the solution is an online real estate solution, the proposed business model needs to be suitable for an online platform. In light of the above, the author progressed by looking into business models that exist on online platforms and how they can be revised to suit real estate commerce.

3.5.1 Online Business Models – Their Adaptation to Real estate

Several business models exist on the Internet. M. Rapper (2000) defines 9 different types of business models. 5 of these models were of interest in this work because of their plausible implementation in the real estate market. The e-business models of interest were

1. **Brokerage**: - this is a model whereby a fee is charged for each transaction that is concluded. These business model is adopted by businesses which create the market, they foster relationships between buyers and sellers and assist in carrying out transaction
2. **Advertising (Portal)**: the advertising model can be likened to traditional advertising that provides extensive information about anything a customer might be interested in or extensive business specific information, except in this case, it occurs virtually over the web. It is characterised by channelling high customer traffic to the business web-front. Using this model the business (website) serves as the broadcast media, providing information and services like discussion boards, blogs, IM's. The advertiser business model could mean no fee is charged to the client or the client pays for putting up the advertisement.
3. **Infomediary** (information intermediary): -this model involves the provision of autonomous data about businesses and their product/service offerings to customers. Also data about Customer and their behaviours are accumulated, analysed and made available to businesses. Their focus is to aid customers and businesses understand the market
4. **Merchant**: merchant model involves direct sale of product and services. The model is adopted by businesses that produce or purchase good for sale. Goods and services usually have a price tagged to them.

5. **Manufacturer (Direct):** this is a model that eliminates middlemen in a distribution channel. It enables business connect directly to their customers if they create their products and services
6. **Affiliate:** as opposed to the advertising portal, the affiliate model enables customers carry out their purchases or view information about product regardless of where they are on the web. Using this model business receive incentives for allowing customers carry out transaction with other businesses through their website.
7. **Subscription:** using this model, customers are charged a subscription fee for services provided to them. This fee can be charged per annum, per month, per week or per transaction. In some cases they are a one-time charge for a service provided.

One or more combination of these e-business models make up the base model adopted by online real estate businesses. The prominent in the Nigerian market is the brokerage as can be deduced from supply chain (see section 2.2.1).

In developed economies however, other models have been adopted. An example will be the Internet Media works model (IMW) used by COMMREX.com (a web-based real estate information system). The IMW e-business model is an implantation of the subscription model described by M.Rapper (2000). Common to all business models, is that they first provide information to the customer before a transaction can begin. Furthermore, the characteristic of online real estate businesses if they are to be successful as outlined by Z.Lin et al (2004) are; that they adopt business models that works, create a niche by addressing challenging situation in a transition process and provide system that can integrate data from a variation of sources (Lin et al. 2004).

3.5.2 Products Business Model

A business model can also be the niche that distinguishes a business in its industry. This product is developed for various customer segment coined out of the key stakeholders that have been identified in section 2.2.7. Hence the business model adopted will be a combination of the Infomediary, advertising and subscription (see online business models in section 3.5.1). The model is further described under the following headings:

1. **How the business provides value for its clients**: it will make use of the advertising model to provide information to its customer. The customers will be able to gather information about different businesses from the portal and aggregate information at relatively no cost. It would also be inculcating the Infomediary to help all stakeholders

understand the market so that they can participate effectively in the market. I.e. stakeholder's information will be collected in return and used for analysis to provide business intelligence.

2. **How it makes money providing such value**: the system will generate revenue using the subscription model. The selling customers will subscribe to use the portal to promote their listing and be charged a subscription fee. Further primary research will help determine the frequency of charges.
3. **The product's niche in the industry**: the niche the business will be creating is a unanimous real estate e-commerce community with different housing alternatives; property rental/sales, shared housing (rent-by room or buddy-up). It will also provide key information about houses that will help support a customer's decision making process and in turn facilitate speedy transactions. The business will position itself as a comprehensive yet clear information platform on the web. It will be distinguished from all other real estate website as it addresses the need of the customer directly

3.6 Business Model Canvas

There are 9 building blocks of a business that must be identified at the start if the business is to be successful. These blocks are key partners of the business, key functions/activities that it will carry out, the value proposition, key relationships that need to be established, market segments,, key resources, the channels and avenues to reach its customers, key cost/expenditure the business will be making and finally the various revenue generation streams. These elements have been compiled together into a tool referred to as the business model canvas (Osterwalder & Pigneur 2009). The word canvas is familiarly known as a platform artist use for painting, similarly the business model canvas (BMC) is a tool that can be used to develop a picture representation of how a business is scheduled to operate. It helps enhance understanding of what values are to be created, for whom, how and what needs to be done to create such value (Leon van der Heijden 2010). Advancement with technology makes it possible to transcend real estate retail from the traditional market place to the cyber space. Having noted that property retail has not matured to a level whereby it can begin and conclude over the internet, significant aspects of it can still be achieved on online platforms if properly planned (A. I. Oni 2010). It is for this reason that developing a clear picture of how the solution would provide value as a business and be sustained is expedient. The BMC has been used to depict how the solution provided will function whilst generating value. It addresses

four broad aspects which are finance (generation and expenditure), consumers (who they are, relationships required, segmentation), infrastructure (provision, usage, management and acquisition), offer (What benefits exist for the different stakeholders) (Solomon 2011). Figure 3-1 below is a representation of the business model for the solution using the BMC tool.

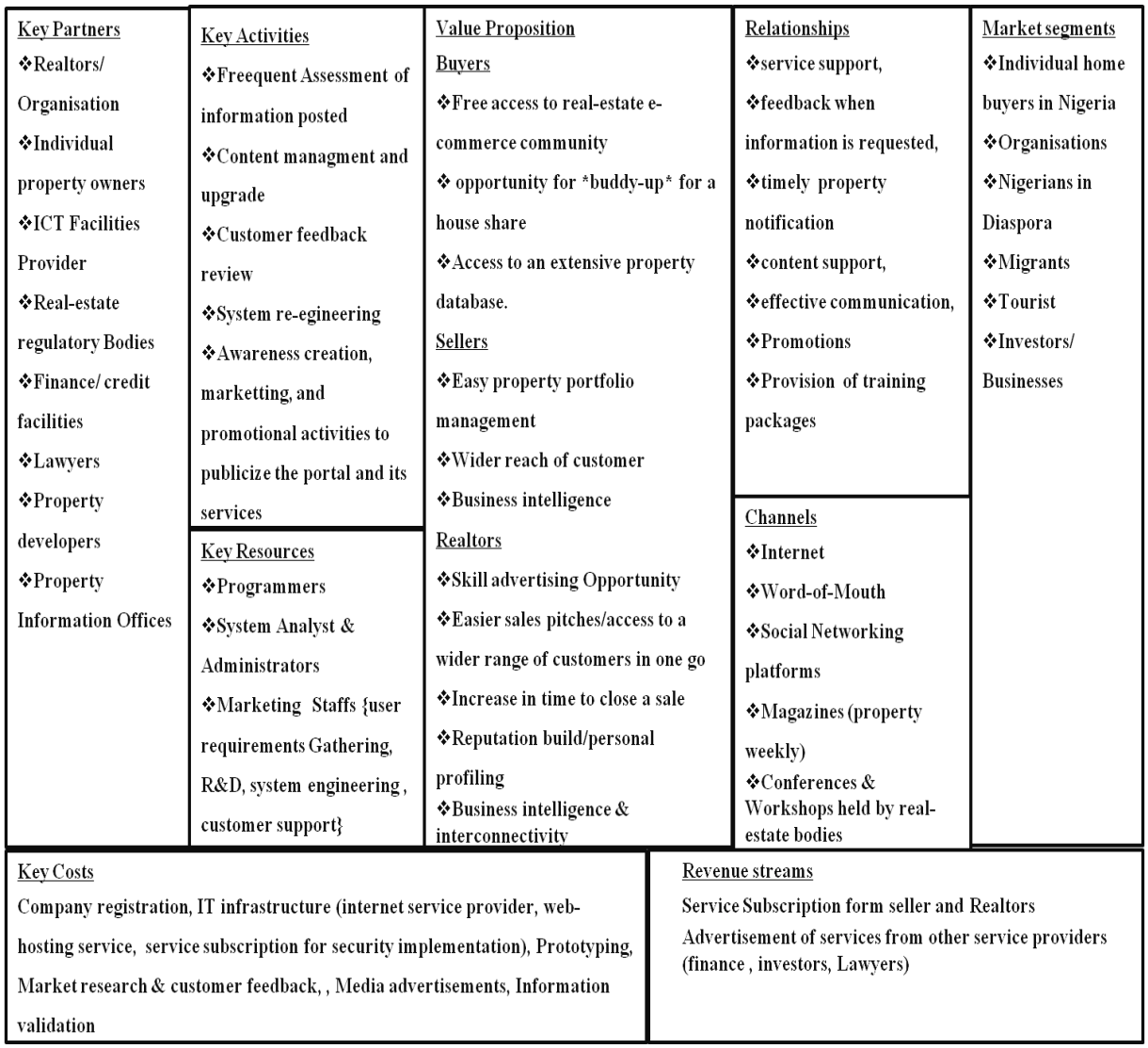


Figure 3-1 Business Model Canvas

On the business model canvas, all stakeholders who would be interacting with the solution are identified. Brief discussions on the different components outlined on the business model canvas are provided below:-

3.6.1 Key Activities

This building block defines the day-to-day function that the business and its resources person would be required to carry out for successful operation. These activities help ensure that the value promised to the business customer segment is delivered. One of the key activities is

frequent assessment of information posted. Assessing the information posted on the portal from time–to-time keeps the business abreast of what type of information is been circulated over its platform, it put users in check and also enables the administrators of the business identify when a problem has occurred and minimize further impact. Another core function is the content management and upgrade. Upgrading the portal helps keep the portal innovative and in line with technological trends and in turn better suited for the upcoming technology driven generation of users. Customers' feedback is a way to hear from the customers how well the business has performed or their partners have performed. Constant review of such feedback would help ensure that the business understands the changing needs of the customer. It would also provide information that would be used for system re-engineering. That is improvement on the portal that will more likely retain the business competitive advantage. Other activities include customer support, mediation. The last crucial activity is awareness creation, marketing and promotional activities to publicize the portal and its services. This activity is very cogent because people cannot use a solution except they know about it. Also high customer patronage is a critical success factor for the business, so customer as much as possible must be reached out to.

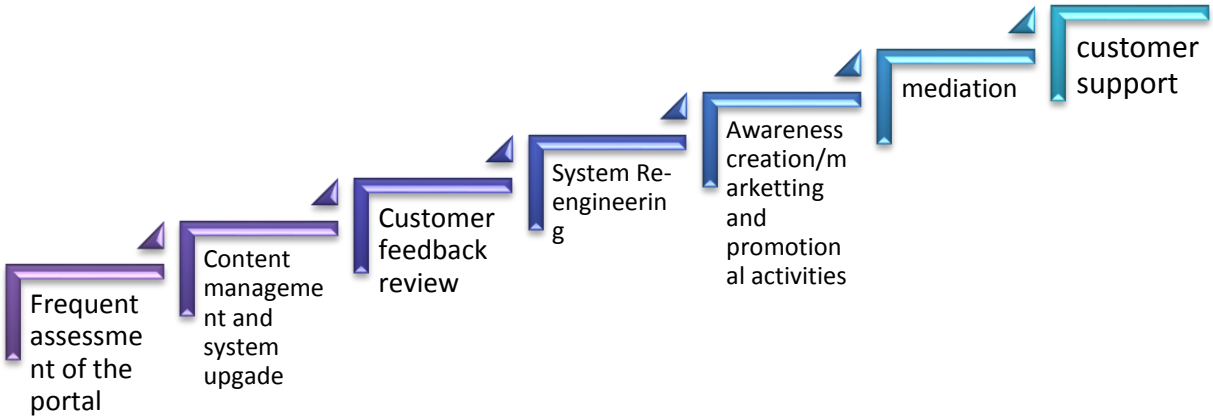


Figure 3-2 Business's Key Activities

3.6.2 Key Resources

Key resources as a building block involve specifying what assets the business would require to function successfully. For this solution, the resources include intellectual, personnel, structural and finance. Being that the business is a core technology solution more of the personnel required are programmers, system analyst, system administrators, and research and development staff. However of key importance is the presence of personnel that are capable of communicating with the customer, they include a customer support team, marketers, and requirement gathering staff. Other resources on the intellectual side include access to

development forums and API's. On the structural side an office would be required. Although the business is a core Internet based business, owing to the intricacy of the type of product handled and the partnerships developed, a point of contact would be required. This is very necessary not only because it provides a structure for the business by ensuring that all personnel work homogenously, but also because it enhances the trust and confidence of partners since they know that the administrators can be contacted if need be. Finally finance is a key resources required to keep the business running at the expected standard.

3.6.3 Key Partners

Identifying key partners for a business requires that careful consideration of the operational processes of the business. Identifying what services it intends to provide and distinguishing between what aspect of it business would need to be outsourced, who the suppliers of resources needed are and what type of service provider in the market the business will be required to work with. For this solution the core business functionality is property information exchange between customer segments. The implication of this is that the product being circulated does not reside with the business operators. As a result the business would require strong and consistent alliances that would keep it running. These partnerships consist of people who have properties to sell, people who want to buy properties and people who collate property information. The vital alliances required for this business to function consist of realtors, private property owners, property developers, organizations in the property business, internet service providers, web-hosting service, online payment management companies, lawyers, property information office's like the AGIS, Local government offices, area council offices and real estate regulatory bodies. The above-mentioned partners are considered key because information, which is the core product of the business, emanates from them.

Other partnerships that would help improve the business's service delivery are the media, credit /loan provision organizations, insurance firms, banks, advertisers etc. These partnerships though not expedient provide added advantage to keep customers attention and in turn provide opportunities for revenue generation. Alliances like the media would help create awareness about the business whilst the other would contribute to the business's revenue by posting up advertisement about their products and services.

3.6.4 Value Proposition

Eromonitor (Euromonitor International LTD 2012) survey show that there has been an increase in the adoption of the internet and other technology facilities in Nigeria from 23,982.3

- 69,118.7 users (`000) over a period of 5years (2008-2012). Also realtors now develop property listing website to help promote their business making information accessible within the consumer's convenience, whilst advertising their services. All of the above bring to knowledge the fact that Nigerians are adopting technology (the internet) and would be open to embrace a technology-based solution as well as pay for services that provide clear, concise yet reliable information for decision support. The value gained from the product can be perceived as follows: -

1. **Wide reach/scope of search:** of importance is the expansion of the search scope for clients i.e. the property listings accessible by clients are not restricted to a locality, the business operations of any realtor or real estate agency. The client in the comfort of his/her home is able to search through a wide range of properties. Also the client would be able to compare the available properties against his/her needs and budget before launching out to contact respective parties. Widening the scope of the clients search to a reasonable extent ensure that the client is getting the best deal available for him/her.
2. **Faster time to close sale:** the probability of closing a sale is greatly increased by reducing the time taken for buyers to get extensive information on properties, decide if they want to proceed to purchase an then contacting the property owner or realtor. Secondly, properties on the market are open to a wider customer base increasing the number of people who might be interested in making a purchase.
3. **Wider customer base:** the portal will enable realtors and real estate agencies open up their business to the global community hence ensuring that there is an increase the number of people interested in their properties and get the best deal from the best buyer as opposed to settling for what a client is offering in a bid to close a sale.
4. **Time/Speed of searches:** the time taken to search and view a property is reduced greatly as the customer can do it online from the comfort of their home. Secondly, the speed of online research is improved as customers can search for listings from different realtors through the same portal as opposed to visiting several individual websites.
5. **Business interconnectivity:** the realtor management system component of the portal maintains an extensive database of realtors and their business relationships. This facility enables realtors as well as real estate organizations register and publish their resumes. The benefit of the component is that they can be contacted if any customer or partnering business is in need of a realtor or a partnership. This information system also has as an added feature a comment section where customer can make remarks on the services offered them by specific realtors.

6. **Portfolio management**: the solution will enable selling customers manage their client effectively as they will be able to gather data on their clients segment, gain customer feedback and improve their listings. Also they will be provided with feedback form through which previous clients can leave comments or indicate ratings on their quality of service.
7. **Reasonably transparent information dissemination**: information dissemination becomes relatively transparent. Transference of fraudulent information is reduced as clients can ensure that the information they are receiving is valid. Also non-repudiation on the part of the realtor is ensured, because false information can be traced back to its origin.
8. **Reduction in cost of information**: the information system makes information available to clients and their decision is aided at no cost. This service tends to eliminate to a great extent the several middlemen that would have been hired or the price that would have been paid for information acquisition as outlined in supply chain (see supply chain in section2.2.1).
9. **Customer Relationship Management:** customer relationships can be managed more effectively and their needs addressed on individual basis. Features such as user membership registration and saved searches allow customers save properties they are interested in so that they can return to it at a later time and proceed from where they left off. It also enables the realtors/agency know the preferences of the clients and they are able to make personalized pitches to each client.

3.6.5 Key Relationships

This building block defines the structured links put in place that business makes to build and sustain interactions with its customers. These links are very cogent because they provide the customer with a sense of belonging and the confidence to transact business with an organization. Maintaining a personalized interaction with customers also substitutes for the personalized interaction a customer would normally get from a brick and mortar business. The first link created for this business is the personalized dashboard. On this interface, features have been put in place such that customers are able to manage their own involvement with the business. The second of these links is service support. The service support is a procedure put in place such that when a customer encounters difficulty using section of the portal, they can go to the service support section ask their questions and receive predefined answers. A feedback and reviews sections also provided. These section acts as a forum where users can put forward their opinion about the business or its service and have other users read

and make comments. Auto-response is also put in place such that when a user attempts contacting the business, receiving these auto-response messages notifies him that the message had been passed across and provides information as to how soon a reply is expected. Customer support avenues are also provided. This is a provision for customers to contact the businesses support team either by mail or on phone and have any issues resolved especially if all other alternatives have failed to address the issues. Timely promotions and training materials are also provided to grow the interaction between the customer and the business. Figure 3-3 illustrates the key relationships of the business.

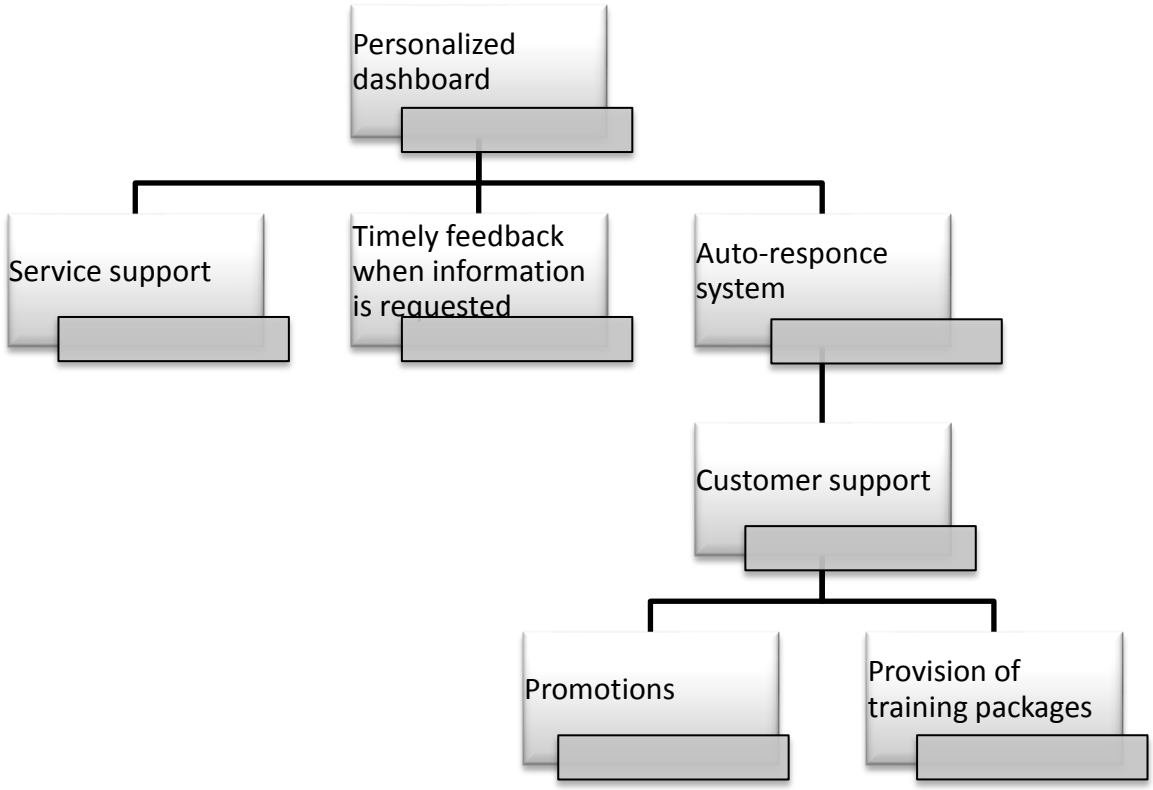


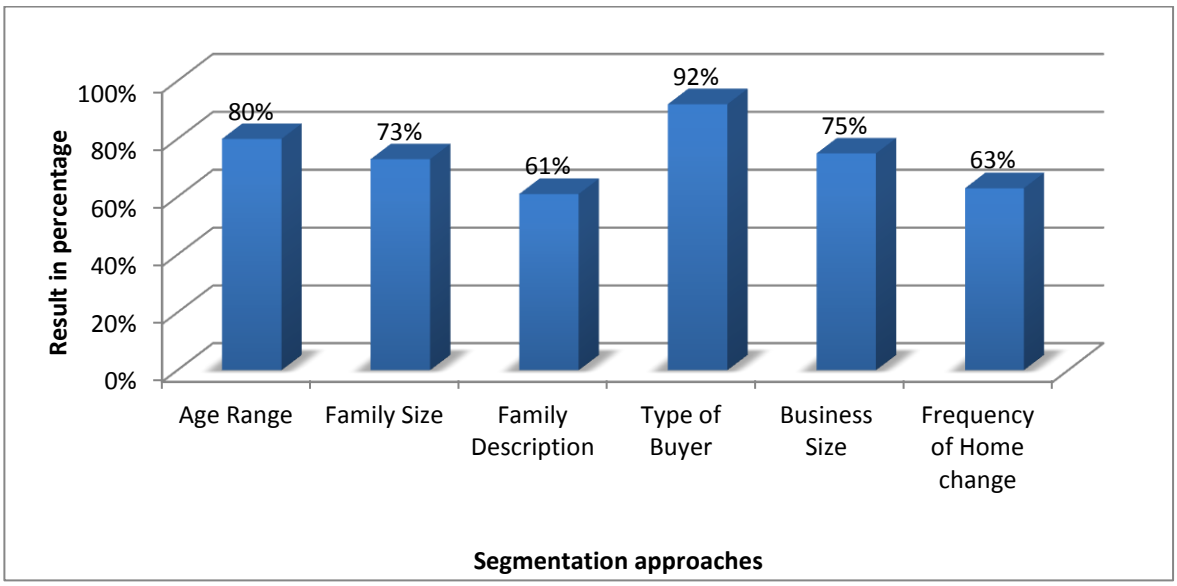
Figure 3-3 Key relationship efforts

Like with the channels, most of the key links are designed to happen within the portal (over the Internet). These relationships would help ensure that the customers of the business are satisfied with the services provided them and they are able to continue a prolonged relationship and eventual loyalty to the business.

3.6.6 Market Segments

This building block defines the way the business would group its customers to be able to serve them effectively. In section 2.2.2, several possible types of market segments were outlined.

For this solution the customer characteristics used for segmentation is the information need. From the results of the primary research showed below



The decision to use these characteristics was formed on basis on the understanding of the information gathered about the NREM and the results of the Primary research. From the result, the most business segment their market on basis of the type of buyer. It can further be deduced that these approach to segmentation is the most functional. Also it was considered suitable for the business because it is a segmentation approach suitable for the solution proposed. After assessing the market, customers who would be using this solution were further sorted into two sub-categories namely first time buyers and repeat buyers due to the variation in information need and familiarity with process. These categories encompass other subsets, which are Nigerians in Nigeria and in Diaspora, foreign investors, tourist or cross-national migrants who are new to the environment and require high quality, safe and satisfactory accommodation within their budget.

1. **First time Customers**

   In this category, customers have had only one previous experience buying/renting a house in Nigeria. These customers tend to be less familiar with operational procedure in the market hence they require more detailed information. Their naivety also tends to expose them to fraud and as a result require more assurance. They are the group of customers who are more likely to be concerned with information verification, source validation and realtor profiling. They are also perceived to be more willing to pay a premium to get the right type of service. Subsets under this category are:-

a. **Nigerians in Diaspora**: - this segment of the market consists of Nigerians, who do not currently live in Nigeria and are in need of properties in the county for residential purpose, business or otherwise. This segment represents 20% of the market taking into consideration the constant effort to of Nigerians in Diaspora Organization (NIDO) to develop Nigeria by investing in its economy or just to secure a good place at home.

b. **Tourist:** - this segment consists of people, who are visiting the country for leisure, business or otherwise and require properties they can lease for the short period of their stay. This segment would at require the property chosen to suite the purpose for which they desire it and do not have the luxury of time to go on an information hunt. They represent 5% taking into consideration that at 2009 Nigeria had a 2.1% tourism share of the total African tourist populace (United Nations World Tourism Organisation 2010).

c. **Migrants**: - these segments consist of people relocating to Nigeria and desire a property that will suit their needs. They make up for 15% of the market taking into consideration that at 2009; 0.7% of the total Nigerian population were migrants with a very small number being refugees. Also the number of migrants has been reported to double consistently over time (International Organization for Migration & European Union 2009).

2. **Repeat real estate customers**

This category of customers has been involved with more than one real estate transaction in the Nigerian market. They have gained some experience and are more likely to detect suspicious activity. There is also the possibility that they would have a preference for traditional processes due to past experiences. These sets of customers are perceived to be more concerned with service comparison, supporting service offerings, networking, reviews. They are also likely to be willing to pay lesser amount for service delivered as they might prefer gather some information manually. The subsets under these categories are:

a. **Nigerians Living in Nigeria**: - this segment of customer which is most likely going to be the largest segment owing to the changing nature of livelihood, work habits, employment and probable dissatisfaction with the property they presently occupy. Repeat Transactions occur at a frequency of 1- 3 years for renting apartment and 5 -13 for purchases(A. Oni 2010). Hence, they represent 50% of the market.

b. **Organizations**: -this segment refers to organizations that want to run employee-housing schemes. They desire to lease or purchase properties for their employee and

there are constraints that guide selection of properties. They represent 10% of the market. A summary of market segmentation is depicted in Figure 3-4 below.

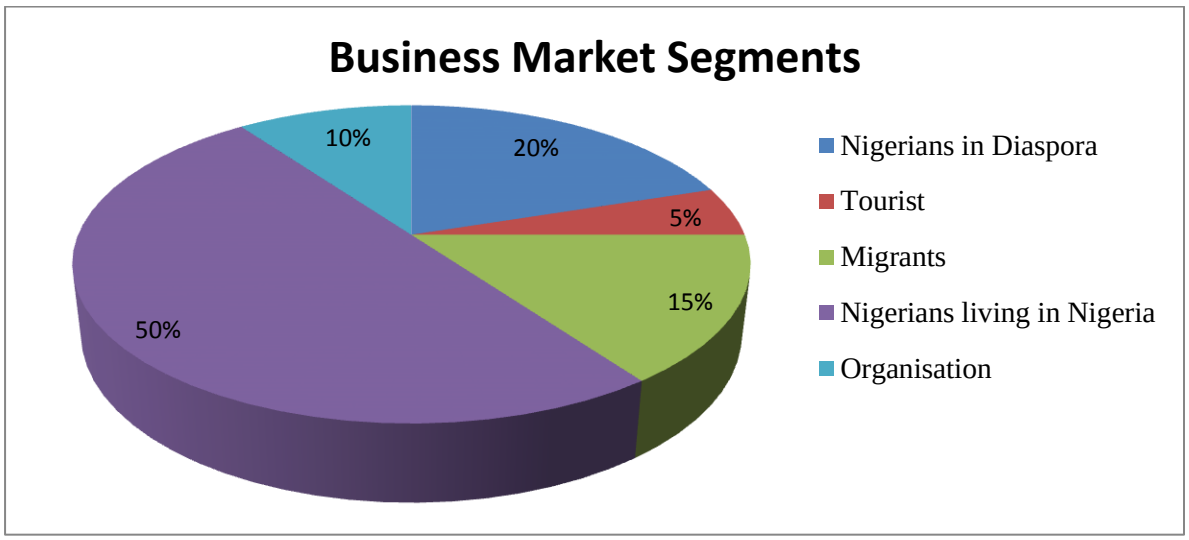


Figure 3-4Market Segmentation Chart

Although buyer type has been selected as the business's approach to segmenting the market, further research would continue to be carried out to identify changing market dynamics and possible review the segmentation approach when need be.

3.6.7 Channels

Channels involve identifying the most suitable media through which the value proposition will be delivered to the target customer segment. Possible types of media are communication, distribution and sales channels. For this business the type of media adopted is the communication and distribution media. For communication two different media are used and they are online marketing and offline marketing. For online marketing, social networking mediums (Facebook, LinkedIn, Naira land, Twitter), customer reviews provided on the website, mail and newsletters opt-in will be used. Also, affiliations the system controllers have will be utilised as an opportunity for marketing/pitches. Such affiliations include Nigerians in Diaspora Organisation (NIDO), Computer Professionals of Nigeria (CPN).

Our offline marketing will be in form of a broadcast, expected to trickle down having a ripple effect. For effectiveness and reduced cost, the communication effort will be targeted at top management, government officials, regulatory bodies, and associations that deal with technology, information management, real estate, as well as consumer protection. Marketing pitches will be conducted for technology regulatory bodies in Government sectors (i.e. Federal

Ministry of Information and Communication, Information Technology Association of Nigeria, AGIS) in charge of the technology adaptation scheme, Professional/regulatory bodies in charge of real estate (i.e. National Institute of Estate Surveyor and Valuers) and many other top real estate organisations/consultants. As an addition, flyers will be printed so that individual/private property owners, private realtors and even the locals (unskilled agents) serve the purpose of publicizing the business. Also advertisement space will be subscribed for in the property weekly magazine published in Nigeria and on TV as well as radio stations. These subscriptions would be used to further create awareness of the solution. Workshops conducted by real estate bodies will also be used to spread the word about the business. All these avenues would be used to communicate with the target customer.

On the part of value delivery, a distribution medium would be used. This medium is the web-portal on the Internet. All distribution task or information delivery carried out in this business would be done over the Internet. This is the case because as much as possible, all correspondence needs to be handled within the portal interface as that is the public point of contact between the customer and the business. A combination of the web-portal, banner advertisement and emails are going to be used for information delivery. Using the portal as the core distribution medium helps ensure that customers get acclimatised with the portal and in turn spend more time on the portal.

The portal would also be the channel for sale. Since sellers are charged subscription for the services they require. These payments would also be handled within the portal. Payment gateways like PayPal will be provided. On the sales however, allowance is made for customers to pay their subscription fee at the bank and log the payment details in their web-profile. This is because customer in Nigeria might feel comfortable paying their money into the bank than use online payment platforms. A diagrammatic representation of all media adopted by the business is provided in Figure 3-5 below.

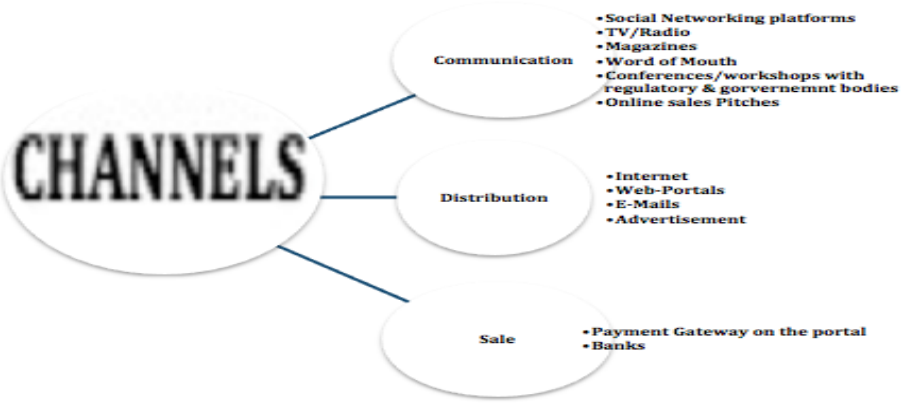


Figure 3-5 Channels adopted for value delivery

3.6.8 Key Cost

For the business identifying the key cost refers to outlining the expenditure the business would have to make in order for it to operate smoothly. The key cost is otherwise known, as a cost structure is a procedure of identifying the key costs, outlining the variable and the fixed cost. After outlining the key activities that the business would need to carry out and what resources would be required. The cost structure is presented Figure 3-6 below. (See Appendix L for detailed expenditure)

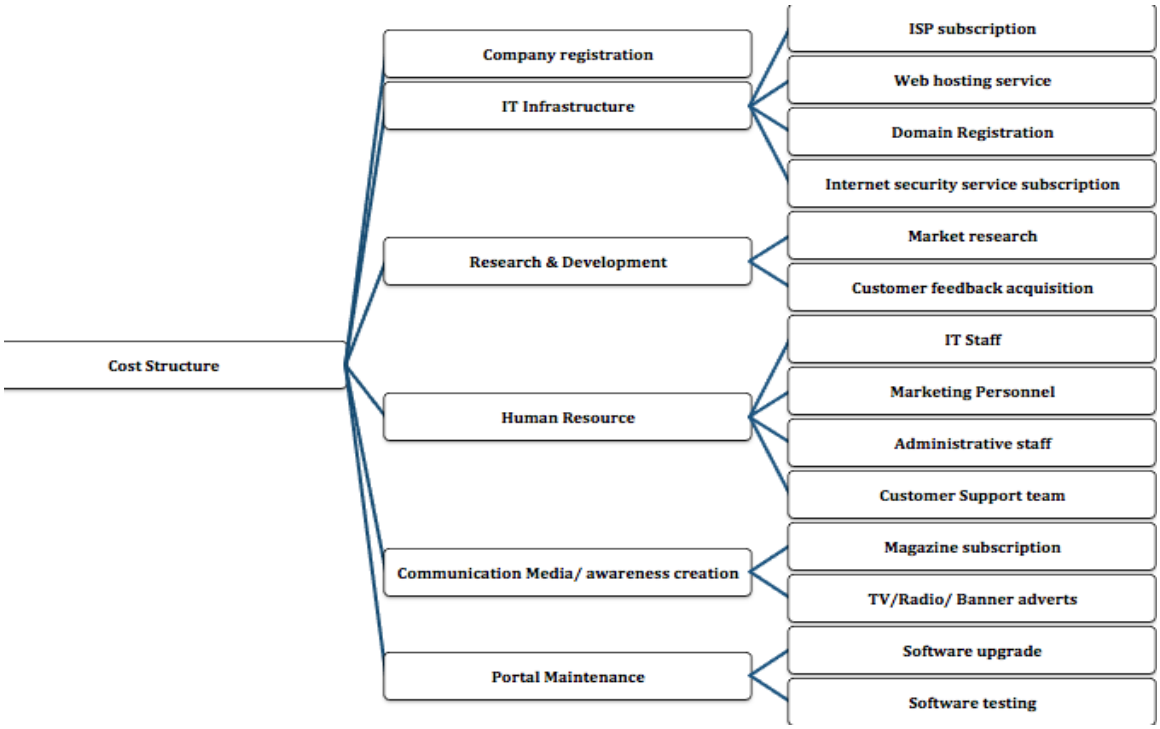


Figure 3-6 Key Cost for the Business

3.6.9 Revenue Streams

This building block provides a breakdown of how the business will recoup investment and creates revenue from the value transferred to its customer segments. Operating the business, revenue will be generated from realtors and property owners who will pay a subscription fee charged to them. Other sources of revenue will be advertisement subscription and sponsorship facilities provided by other business that provide services that have some relationship with properties. Examples of such business would be legal firms, banks, insurance companies as well as other private/public financing schemes. A diagrammatic representation of all media adopted by the business is provided in Figure 3-7 below.

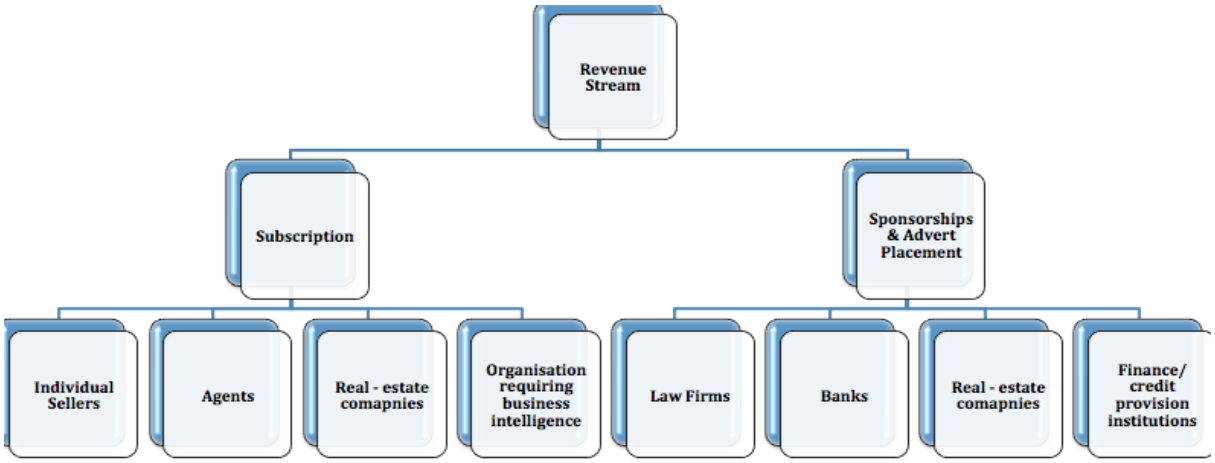


Figure 3-7 Diagram depicting the revenue stream

Having discussed the business model considered viable for the solution. Further attempts were made to validate the underlying knowledge used to develop the model as gathered from the secondary research. The business model was also tested to ensure that it is viable. In the next section a summary of the hypotheses that were tested is presented.

3.7 Hypotheses that Primary research should validate

1. Customers tend to change their homes at a min of 3 times every 10 years hence market activity is relative to same frequency.
2. The best way the market can be segmented is on the basis of the information need. This is achieved by grouping customers into the frequency of their property transaction.
3. People would be willing to use the web-based portal as an alternative solution to traditional systems.
4. Realtors and users alike would be happy to eliminate middlemen from the property supply chain so as to increase/reduce cost.

5. A web solution will be of preference when seeking properties in terms of flexibility, and effectiveness even in a developing economy like Nigeria
6. Users would be willing to pay for online real estate information if it addresses their need?
7. Realtors might perceive the solution to pose the following threats?
    - Anonymity of interested customers
    - Data protection
    - Loss of competitive advantage

    And as such might prefer to withhold certain information from the public.

8. Targeted customer segment are Technical capable to use the solution that would be provided to them.

3.8 Summary

Having assessed the viability of this solution as a business; it is the authors resolve that the opportunity identified is key to impacting the real estate market. More so the stakeholders' needs identified are needs that are insatiable and as a result indicate prospects for versioning of the solution provided as the business progresses. Although few challenges might arise with development in the future, they all come under the acceptable risk threshold. This allows the business a promise of return on investment, customer satisfaction and a good brand identity. In the next chapter the primary research that was conducted is discussed and validation provided to ensure that the solution is useful to the client, the business model is appropriate and users would be willing to pay for it.

4 Primary Research Presentation

While the secondary research utilised data that was obtained and reported by other researchers, the author went on further to conduct a primary research. This was the case because although the information accumulated by previous researchers has been very useful in understanding the industry and the market, their applicability is restrained. This opinion bothers on the idea that some of the information collected was collected for a different purpose and at a different time. It is for this reason that further research was carried out using primary data. The previous chapters have discussed the secondary research. In this chapter the primary data is used to analyse the market for the product developed. It is also used to validate the hypotheses listed in section 3.7. Primary data can be acquired using surveys (asking subjects questions about their opinions and choices using a questionnaire), interviews (asking subjects questions in a one-to-one or one-to many style) and observation (observing an environment, people or trend and taking records) (Driscoll 2011). Conducting a survey was considered ideal for this research as it helped validate information acquired from previous researchers whilst gaining new information about the market.

Several approaches were considered for carrying out the survey some of them include; telephone survey, mail survey, internet survey, in-person interviews, observation. The selection of survey methodology as outlined by K.Curtis, is dependent on the purpose, time frame to collect data, number of responses wanted by the researcher, cost implication and characteristics of the subject (Curtis 2008). There were several factors surrounding the data collection procedure. These factors were, short period to collect data, author's residence in a country different from the one studied and sizeable number of responses required, since the solution was for a varying range of customers. Taking into consideration all the factors identified, the author decided that Internet based survey will be more suited for data collection. Internet survey refers to all questionnaires distributed online and responses received online as well (Curtis 2008).

4.1 Survey Design

Two different types of questionnaires were used during the Internet surveys for data collection. They are close type questionnaires and open type questionnaires. A combination of both types of questions was helpful because the former helped validate assumptions made from the secondary research and the later served as supporting research. It provided direct data on the target customer and helped broaden understanding as to how the real estate market

functions (Glasow 2005). The differences between the question types are provided in the table below.

Closed Type questions	Open type Questions
Respondent answers are constrained	Respondents express themselves in their own language
Validates already known information	Allows room for new information as responses are not constrained
Faster feedback	Slow or sometimes no feed back
Easier to understand	Takes a longer time for respondents to relate to the questions
Easier for quantitative analysis	Applicable when considering qualitative analysis
Makes it easier to get a best fit stakeholders at the minimum	Wide variation of responses introducing difficulty to codify
Information from larger number of stakeholders	Information from fewer people

Table 4-1 Summary of closed type questions VS open type questions

Closed ended questions were used to acquire feedback from the customers who will be using the system and a few realtors. While the open-ended questions was used to conduct online interviews. The survey was facilitated by the use of web-based tools, which are the Skype for open type survey discussions and Goggle form for the closed type questionnaire distribution. The Google form provided tremendous assistance in the development of the questionnaires and more importantly it was efficient to use in that as responses were being submitted it summarised the results using charts and graphs making for clearer analysis. Subsequent section provides discussions on the survey rational and results gathered.

4.1.1 Explanation of Rationale behind the survey

The reasoning behind the survey conducted is explained in this section and further insight is given as to why there were asked or what information they were intended to validate.

Home Buyers Questionnaire

The buyers who participated in the survey were asked a total of 20 questions. These questions were mainly aimed at validating that the provision of property information on the web would significantly improve the process involved when buying their homes. Four other assumptions were tested in the questionnaire. One of the assumptions was the frequency at which people change their home. This helped to anticipate the number of customers expected for the portal. The results would also be useful in estimating what ROI there is for advertising investors and what are the best ways to manage the customer relationship in order to keep them coming back. The second assumption made from the secondary research about the factors that affect

the real estate market. The factors tested were urbanisation, increase in income, job changes and change in the size of the household. Responses also helped provide insight as to which of the segmentation approaches outlined in Table 2-1was more suitable for the business. In designing the survey, attempts were made to identify approximately how many middle men have been involved in previous transactions carried out by the customers and also what appetite they had to eliminate or at best reduce the number and cost associated with the participation of middle men in their transactions. Finally the questionnaire tested that the target customers have the technical capabilities to be able to utilize the services the portal will provide them. A full copy of the questionnaire is provided in Appendix G, however a summary of questions and what assumption they each validate is provided in the table below.

Questions	**Hypotheses/Assumption Tested**
Question 1 to 5	• Identifies the different demographics that exist in the market • Tests the market segmentation approach adopted and clarify best ways that the market can be segment, if the approach adopted is inadequate
Questions 6 and 7	• Establishes that customers use the internet for property search • It also tests which sources the customer trust for information
Question 8	• Identifies frequency of market activity
Question 9	• Identifies the trends that drive demand in the market • Measures what trend has more impact on the demand
Question 10, 11,12,16, 17	• Tests that using the internet will be of preference compared with traditional methods of gathering housing information • Tests that online platforms are sufficient to assist a customer in finding a home that is perfect for them • Tests that customers prefer to enjoy the flexible option when searching for properties from home before needing to do a viewing or contacting the realtor • Identifies at what point customers consider the internet a tool in a real estate transaction and for what actions
Question 13	• Identifies what are issues that responsible for the inability of already existing competitors to serve the customers need • Identify factors that affect the usability of existing web sites/portals
Question 14	• Tests that customers will be willing to pay for information they gather over the internet • Identify how much they are willing to pay
Question 15	• Tests that customers are interested in shared renting • Tests that a platform that enables people to engage in shared renting will make housing more affordable
Question 17, 19	• Identify what factors prevent customers from using web solutions for real estate information acquisition
Question 20	• Customer’s willingness to participate further in the survey

Table 4-2 Buyers Questionnaire assessment

Realtors Questionnaire

Questionnaires were also developed to gather feedback from the realtors as well and all other professionals that undertake the role of a realtor. Even though they are not the main focus of the system, they are key players as they understand the industry from first-hand experience and are the people who would ensure that service promise is delivered. The questionnaire responded to by realtor contained a total of 22 questions. The questions were intended to validate the structure of the market, identify where improvements are desired. Where the industry is with technology adoption, what challenges exist with technology adoption? Other assumptions were tested as well and they are; the opinion that middlemen have significant impact on their transactions and realtors are willing to reduce or remove the middlemen from the supply chain. Another assumption that it tests is that realtors would be open to use a unanimous platform to enlist the properties they handles even though their competitors would also be present on the same interface. The hypothesis that realtors as well as other service providers in the industry will be willing to pay a fee for advertising was also tested. A full copy of the questionnaire is provided in Appendix G, but a summary of questions and what assumption they each test is provided in the table below. Indifferent

Questions	**Hypotheses/Assumption Tested**
Question 1and 2	• Establishes the realtor's usage of the internet for property showcasing • Identifies the scale of properties they handle • Provides insight as to their likelihood to want to invest in Technology
Question 3, 4	• Tests that the supply chain involves several players acting in capacity as a realtor • Reveals what qualifies them as realtors providing insight on their skill set
Question 5,6	• Tests that using the internet will be of preference compared with traditional methods of sharing information • Online platforms is perceived to be sufficient to assist realtors in distributing information about their properties/ pitching a sale • Tests that it is the realtors opinion that such solution would assist their client in easily making a decision and committing to a sale
Question 7, 8, 9, 12, 13	• Identifies how many middle men are involved per in their transactions • Identifies how much it cost to keep the middle men in the transaction cycle • Tests that they are willing to reduce or remove completely the middle men • Tests that realtors will be willing to pay for services provided them by the portal • Tests that other players will be willing to pay for advertising • Identifies how much they will be willing to pay
Question 10,	• Identifies what factors affect the usability of web- portals

11 and 14	• Identifies what barriers are considered a worthy trade-off for others • Tests what issues hinder internet based businesses in Nigeria
Question 15	• Identifies what type of information they prefer to disclose to their clients • Identify what type of information they would like to share with their clients but are unable at the moment
Question 16,17,18,19,20	• Tests that the realtor is poses the technological skill to use the information system • Identifies the level of competence as well as what activities they currently use the internet for • Tests that they use ICT infrastructure for their business process • Identifies what aspect of their business processes have been transformed by ICT
Question 21	• Identifies what factors realtors perceive prevents customers from using web solutions for real estate information acquisition
Question 22	• Customer's willingness to participate further in the survey

Table 4-3 Realtor's survey questionnaire assessment

4.2 Results Evaluation and Analysis

After outlining the rationale behind the design of the surveys', progress is made by evaluating and analysing the responses that were received. A total of 200 respondents of different ages, occupation and from different parts of Nigeria (majorly Abuja, Lagos and Port-Harcourt) were contacted to participate in the survey. These two hundred respondents consist of 150 buyers and 50 (sellers and realtors). Out of the 200 anticipated participants a total of 94 responses equivalent 47% of the total contacted participants were received. 82 of these were buyer respondents and the remaining 12 were realtors and Sellers respondents.

4.2.1 Buyers Survey Result

Results of the responses received from buyers are presented in Appendix H using bar and pie chart. However discussions and a brief summary of findings are discussed in this section.

Demographics of buyer respondents

In the survey, questions concerning the characteristics of participants in the market were measured in other to identify patterns. Identifying these patterns was necessary to validate requirements used when developing the solution. It also provides insight as to the likelihood of market activity as well as the frequency with which this activity will occur. Assessing the market demographics was also useful to corroborate that the market segmentation approach proposed while developing the business model was appropriate. If results suggest otherwise, alternative measures will be inferred from the result. The presence of a pattern in the demographics would help in effective revision of the portal, as factors like age would

determine a user's penchant as well as accessibility to information technology and the internet. The table below shows a summary of the results of buyer demographics.

Characteristic measured	Number of Respondents	% of total respondents
Age Range		
61 and above	1	1
46– 60	14	17
31 – 45	44	54
15 – 30	21	26
0 - 14	2	2
Family Size		
11 and above	3	4
8 - 10	4	5
5 – 7	15	18
2 – 4	33	40
1	27	33
Family Description		
Grand Parents	1	1
Old Couples	12	15
Young Couples	20	24
Newly Married	18	22
Single	30	37
Purchased /Rented a house		
Yes	75	91
No	7	9
Type of Buyer		
1st time buyer	30	37
Repeat buyer	45	55
Never bought or rented a house	7	9

Table 4-4 Buyer demographics

Implication of buyer Demographics on the market and the solution

The summary of data presented in the table above is a representation of the demographics of participants in the market. From the sample selection of people who completed the questionnaire, it was discovered that in the NREM, transaction activity is highest among people who are between the ages of 31-45 who are single, newly married or young couples and cater for a family size of below 7. Following this age bracket in order of market participation are people aged within 15- 30 and finally people aged 46 – 60. There is also a very high probability that buyers within the 31 – 60 age brackets constitute the higher percentage of repeat buyers. This is the case because of the total respondents, 92% have either bought a house or rented one. Of this 92%, 55% are repeat buyers, 37% 1st time buyers. This trend in the market is very promising as it shows that there is going to be significant market activity. High market activity will occur for several reasons, one of which is the fact that

younger people carry out majority of transactions in the market. Significant number of responses resulted from younger people aged 15- 60. When compared with figure reported by the US intelligence agency that 55.9% of the Nigerian population range ages 15 – 64 (see age distribution statistics in Appendix F) (US Central Intelligence Agency 2012). It can be inferred that there is a promise of high market activity as well as frequency in the market activity. This is the case because the people within this age bracket are yet to have fully established families so their family size is more likely to change, meaning they will require to buy/rent properties frequently.

Secondly, the research survey was carried out over the Internet and the higher percentage of respondents fall within the ages of 31-45 and the next highest range from ages 15-30. The inference that is made from this result is that the younger the buyer, the more likely they are to have access to the Internet and in turn the more likely they are to use the web solution provided. Similar opinion was recorded by Olatokun, who through a survey resolved that in Nigeria, the internet usage is more prominent among the younger population because they poses a higher capability to manipulate systems to achieve the its purpose of design (Olatokun 2009).

Finally validating hypothesis 3 in section 3.7; on market segmentation. A proposition was made in section 3.6.6 that the market would be segmented on the basis of buyer type. This approach has been validated by the demographics of the market as appropriate. Evidencing this opinion, it can be seen from the results of respondents, the area that had the higher percentage when they were asking the question concerning segmentation approaches considered was frequency of purchase/rent. Also these results depicted a clear distinction at a ratio of 37:55 first-time to repeat buyers. Another question, which is the family description, was asked to investigate the occurrence of a more significant pattern. If a more distinct pattern were discovered, the results would have helped provide a basis to revise the business model.

From results gathered from the 82 respondents, people whose ages range between 15- 60 years, and are single, newly married, young couples or old couples recorded the highest response. However it is the case in Nigeria that the status of the family does not portray how many people live together. This is the case because of the existence of housing arrangements whereby family members or friends cluster together in the same house. As a result of the above, it becomes challenging to distinguish between the information need of family types based on their description. In the next section result on the questions relating to service usage are analysed and surrounding hypotheses reported on.

Service Usage

These results validate hypotheses 3,5 and 8 in section 3.7. In the survey, question were asked concerning the skill set required to use the solution developed, the internet, what activities target customers usually carry out online, their belief, trust and confidence in the use of web-based solutions. Customers were also asked if they would like to gain some knowledge about the properties in the market before going out to do a viewing. They were also asked if they would be willing to use the system provided them, what their perception of the solution was and the level to which they believe the solution as described would improve their real estate purchase experience. Questions were further asked to determine, what difficulties they envisage or what factors either previously encountered or anticipated they think prevents them from using web-based solutions. A summary of their responses is presented in the table below. See Appendix H for detailed charts.

Question Asked	Options	Number of Respondents	% of total pondents
IT Skills	Advanced Good Intermediate	38 33 10	46 40 12
Usage of the internet for property search	Yes No	43 39	52 48
Trusted sources for real estate information	Realtor Websites Social Networking sites Newspaper Adverts Area council offices Individuals, Neighbours, family and friends	36 22 9 22 14 55	44 27 11 27 17 67
Frequency of changing homes	Over 10 years Every 6 – 10 years Every 2 – 5 years Every year Unscheduled	5 6 18 1 52	6 7 22 1 63
Desire to gain insight of properties on the market before viewing	Yes No	80 2	98 2
Trust that the solution will solve the intended need	Definitely agree Agree	22 57	27 70
Interest in using the solution developed in this work	Yes No	80 2	98 2
Mitigating factors to the	Data protection	45	56

success web-based real estate information systems	Others	60	74
Activity of preference when using web based real estate solutions	Viewing properties Contacting the realtor Access to realtors profile Reading reviews from other users Posting up an ad	66 34 19 14 33	81 42 23 17 41
Mitigating factors against usability of web-sites	Long user registration forms Page refresh rate Easy navigation Absence of technological skill Preference for manual processes Security of the information source Reputation of the information source Search flexibility	29 17 30 5 21 43 49 29	35 21 37 6 26 52 60 35

Table 4-5 Buyers service usage determination data

Implication of results

Inference can be made from the results presented above that customers have the capability to use the system provided. Capability measurement involves the testing that the target customer can efficiently manipulate the system placed under his control in other to generate desired value/result (Olatokun 2009). The deduction that the target users are capable of using the system arose because 86% percent of the respondents indicated that they had above average IT skills. If such a high number of customers already have reasonable experience with IT, it means that the solution is developed for people who are already technologically savvy and as such they would easily adapt. These figures also show that less effort would be required for change management on the part of the business. Training and support offered to the customers will also be quicker and more effective.

Another interesting discovery that was made was on the usage of the Internet for property search. Results from this question depict an almost even distribution among people who use the Internet for property search and people who do not. The results show a ratio of 52:48 when measured in percentage. The implication is that although the majority of respondents have above average IT skill, almost 50% have not necessarily had experience with using IT systems for the purpose of real estate information acquisition. Also when asked what sources they trust for real estate information, the 67% said they trust individuals/neighbours/family/friends, 44% said they trust realtors for 27 % trust newspaper publications, 27% trust websites. The deduction that can be made from these findings is that there is that users are sceptical about the ability of online solution to meet their real estate needs. Similar deduction can further me made because when the same set of customers were asked if they would use the solution being

developed or if they would like to gain an oversight of the properties available on the market before scheduling a viewing, 98% would like to view properties online and 98% were interested in making an attempt to use the solution being developed, but when asked if they believed it would meet their need, 27 % were certain because they selected definitely agree and 70 % selected agree depicting some level of uncertainty.

These inferences indicate that plans need to be made to encourage property renters to embrace the use of web-based solutions. Intensive marketing, free access as stipulated in the proposed business model, can provide encouragement for customers. It has also been discovered that real estate customers seem to attribute higher level of trust to sources of information that have a personal relationship with them. These finding would be put in good use to increase the customer turnover. The author, believes that if promotion are designed such that rewards giving to people for who introduce the solution to their neighbours/family/friends, as long as they indicate who has invited them when signing up; more and more people would be exposed to the system. They would also be encouraged to use the service.

Service Pricing

These results validate hypothesis 6 in section 3.7. Inquiries were made regarding what would be an acceptable price if the customers were to be charged for service provided them. Although the business model proposes no charge at the moment, there might be a need to charge a fee as the solution is revised. The chart below depict the responses received when customers where asked how much they would be willing to pay for the service the solution provides.

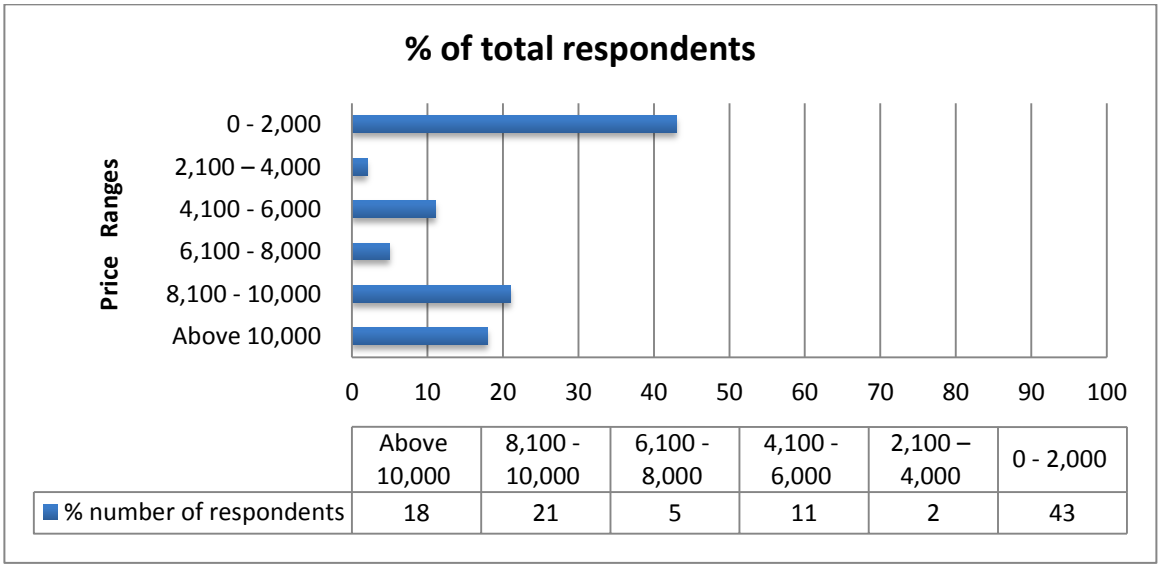


Figure 4-1 Buyers payment affinity

Preferences that are highlighted by the results indicate that the majority (43%) of customers will prefer to pay between 0-2,000NGN for the service. This development is consistent with the pricing plan in the proposed business model. An interesting indication is the fact that over 39% would be willing to pay 8,000 and above for the services delivered. This knowledge would be inculcated when revising the business model i.e. when the service is improved and becomes more popular, customers will be charged a maximum fee of 10,000 NGN for service subscription. However, if buyers will be charged for subscribing to the service at some point, all stakeholders must improve their services offerings so that the customers would be retained. One of the ways this can be done is ensure that the realtors pay more attention to detail and ensure that their listings are frequently updated and all information provided is reviewed at intervals. In the next section we look into the responses gotten from realtors to be able to identify what lessons can be learned.

4.2.2 Realtors/ Sellers Survey result

Questionnaires were sent out to realtors. The realtor question was sent out to a combination of individuals who by one means or the other have come to provide the services of a realtor. These include property owners, trained realtors, people who provide similar services based on their experience over time, people who learned to be a realtor as a vocation and other middle men representatives. A combination of characteristics was important in other to gain a fair assessment of the real estate practice in Nigeria and also identify what needs are peculiar to certain types of realtors. The chart below shows a classification of the respondents.

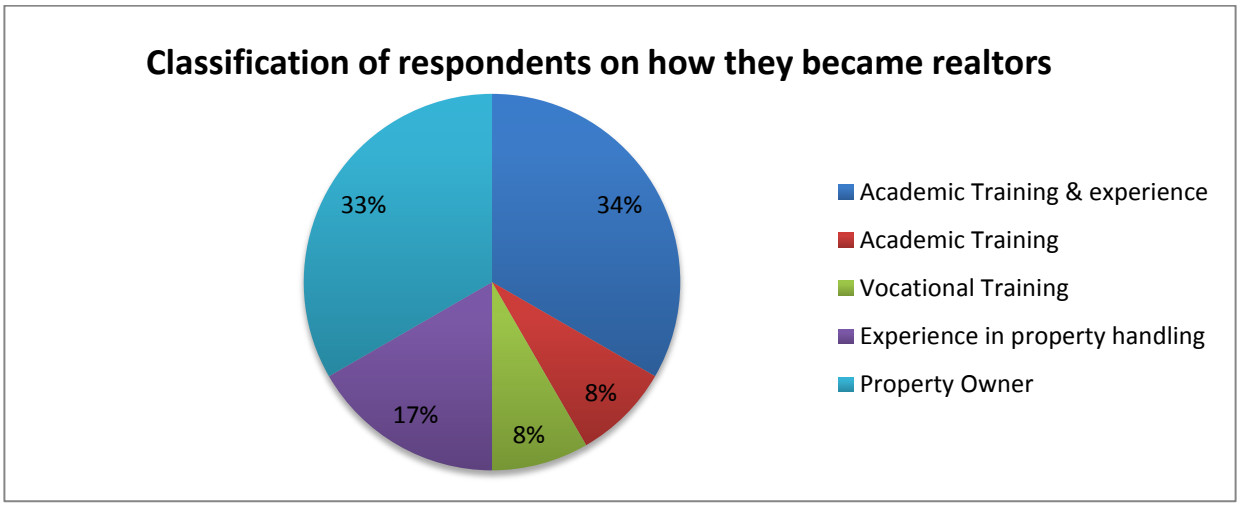


Figure 4-2 Seller's Classification according to qualification

The results acquired show that of total number of respondents, 33% were realtors who had both educational training and field experience. 34% were property owners who have come to

function in the industry by virtue of sale of their properties, 17% had no educational training but had acquired field experience and hence participated in the market as realtors or middle men. When inquiry was made as to the scale of properties they handle, their level of competence as realtors and their usage of the Internet for property search, the following result was acquired.

Question Asked	Options	% of Total Respondents
Scale of properties managed	Very Large Large Intermediate Small Very Small	17 42 33 8 0
Assessment of skill set as a realtor	Highly skilled Skilled Semi-Skilled	33 58 8

Table 4-6 Realtors Business handling (Size and Skill information)

Their responses revealed that regardless of the variations in their qualification, they have performed reasonable well in regard to their skill set as realtors. This good performance is further evidence by the scale of properties they are hired to handle. The results show that 92% of the respondents have their business size ranging for intermediate to very large.

Having identified the different type of realtors, investigation continued to identify their technological exposure/capability. Detailed chart representations of their responses are included in Appendix H. However discussions and a brief summary of findings are discussed in this section.

Technical capability to use solution

These results validate hypothesis 8 in section 3.7. Questions to ascertain the technical capabilities of the realtors were asked. It was important to assess their exposure to IT system, ascertain what activities as well as IT tools they have been accustomed with. The essence of these assessments was to make sure that the realtors have the technical knowhow to operate the system that is being developed. It would also help identify what need exist and how much training or support would be required when the start using the platform.

Questions Asked	Options	% Of total responses
IT Skills	Advanced Good Beginner	42 50 8
Usage of the internet for property search	Yes No	83 17
Adoption of ICT into their business	Yes No	67 33
What they have used ICT for in their business	Company profiling/ information publishing e-mail/instant messaging Record keeping Accounting Human resources Management Property Listing	50 92 42 8 17 42
What areas of their business has improved	Information dissemination Property Listing Customer relationship Sale pitches Company profile management Career/hiring processes Partnerships	75 42 67 58 50 33 42

Table 4-7 Realtors IT capability measurement results

Inference from results

From the summary of results presented in the table above, 92% of realtor poses good technology skill, of the 93%, only 83 has used the internet for property search or listing. The more prominent use of IT by realtors in their business process is to carry out functions like company profiling, document publishing, emailing/instant messaging, and human resource management. The inference from these results is that realtors have adopted ICT into their business process and boast of improvements in several areas of their business including activities particular to properties like sales pitches, property information dissemination and partnerships with other realtors. So if the solution is able to offer all the following features in one platform in addition to innovative functions that can be used for their core business processes, it will open uncontrollable doors for even more improvements.

Further inference can be made that since the realtors are already conversant with carrying out this activities, any solution that bring all this process together on one interface and provides

them the ability to carry out their core real estate function would be a welcome innovation. The chart below shows the prominence of activities they carry out on the Internet

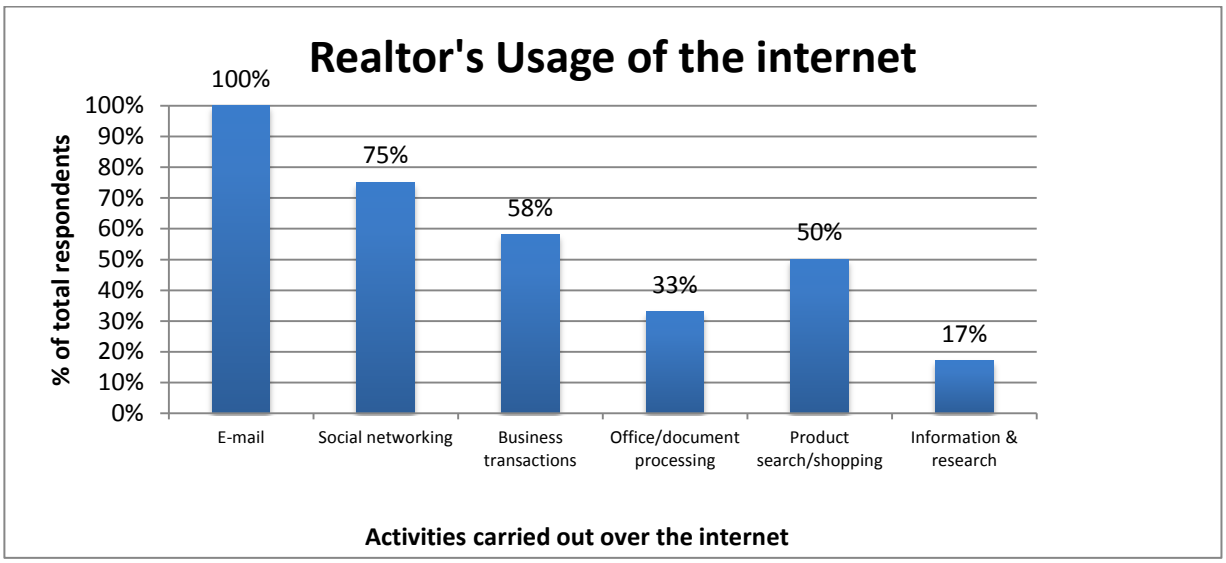


Figure 4-3 realtors Internet usage statistics source: survey conducted

From the chart above, it is evident that the order of importance of activities is e-mail, social networking, business transactions and the product search. Hence in developing the solution a priority would be giving to ensure that one the portal, realtors have the ability to send and receive e-mails. In subsequent revision of the portal the other functionalities will be added according to their order of importance.

The next hypothesis that was tested was (hypothesis 3 see section 3.7), interest of realtors to subscribe to the solution that was being developed. A brief explanation was provided the realtors and they were asked about their interest to subscribe. A summary of their responses is presented in the table below

Questions Asked	Options	% of total respondents
Interest in using the solution developed in this work	Yes No	100 0
Trust that the solution will solve your customers need	Definitely agree Agree	33 67

Table 4-8 results of Interest and trust level in solution provided

The results gathered showed that all respondents were interested in using the service the portal would provide especially because they expect that it would be a point of convergence for realtors and property type businesses. Eventually when they were asked if they trusted the solution would meet their customers need, 33% were very certain it would and the other 67% agreed it would but expresses lower certainty. Further on inquiries were made regarding their

willingness to pay a subscription (hypothesis 6 see section 3.7) fee in other for them to gain access to the system. Responses gathered a summarized below.

Questions Asked	Options	% of total respondents
Wiliness to pay for subscription/ advertise services offered	Yes No	92 8
Maximum spend on subscription cost	Above 100,000 Unlimited (unrestricted access) 81,000 - 100,000 premium membership (max 30 properties + realtor profiling) 61,000 - 80,000 Advanced membership (max 10 properties + realtor profiling) 41,000 - 60,000 beginners membership (max 15) 21,000 – 40,000 /5 property listing only	42 0 25 8 17

Table 4-9 Results of customer willingness to pay for the service provided

Results show that 92 % of the respondent were happy to pay a subscription fee, of the number, 42% were ok with paying above 100,000NGN for unlimited number of properties, 25% were ok with paying 80,000NGN for a maximum of 10 properties in addition to a profile page for each realtor, and 17% preferred to pay a maximum of 40,000NGN to enlist only 5 properties per subscription. It can be inferred that the preference in subscription cost is dependent on the number of properties they handle. These finding would be used for timely price reviews or for development of promotions. Another issue that was investigated was the presence of middlemen in their business and the financial impact it has on their profit margin. The discussion provided in the next section reports on the findings made.

Middlemen and their cost implication

These results validate hypothesis 4 see section 3.7. Respondents were asked at the minimum how many middlemen where involve in each of their transactions and what cost implication their involvement had. They were also asked to indicate if they were willing to replicate the functions of these middlemen. A summary of their response is presented in the table below.

Questions Asked	Options	% of total respondents
Number of Middle men involved in one transaction	4 – 6 1 – 3 0	17 58 25
Percentage of transaction that goes to the middle men	10% 5% less than 5%	33 33 33
Desire to replicate the function of a middle man	Yes	83

	No	17

Table 4-10 Results of questions concerning middle men and their market impact

The results show that on the average there are 3 middlemen involved in a real estate transaction. Also 33 % of Respondents disclosed that middlemen take 10% of transaction value; another 33% disclosed that they take 5% and another 33% said that middlemen take less than 5%. Inference can further be made that of the 33% that pay less than 5% of their transaction value, the majority account for the 25% of respondents who do not involve middle men in their transaction and the other percentage comprise of transaction involving at most 1 middle man. When the respondents were asked about their willingness to eliminate the middlemen, 83% were in favour and the other 17 % voted against. The author's deduction from these results is that since the majority prefers to have the middlemen cut from the supply chain, they would embrace a solution that replicates their activity. And subsequently, the other 17% who voted against who may comprise of middlemen themselves, meaning that their source of livelihood is at stake; might be catered by providing solutions tailored to their needs.

On a final note, questions were asked as to what challenges exist with Internet based solutions and which they think might arise when they begin to use the solution developed. The information gathered is reported in the next section.

Challenges anticipated with the solution being developed in this work

These results validate hypothesis 7 see section 3.7. It was necessary to gain insight as to what challenges realtors anticipated so as to continue further research and investigate ways by which the identified challenges can be curtailed. The information gained would also help highlight areas they consider a worthy trade off so that attempts can be made to include it in the development stage of this work. These were their responses.

Questions Asked	Options	% of total respondents
Factors that limit the success of internet property business	Anonymity of interested customers Data protection Loss of competitive advantage	8 50 33
Mitigating factors to success web-based real estate information systems	Long user registration forms Page refresh rate Easy navigation on the website Absence of technological skill Preference for manual processes Security of information source Reputation of the information source Search flexibility	50 8 42 25 50 42 42
Features that are considered a worthy trade-off the cost of adopting ICT	Robustness of the solution Security Detailed information Pictorial information Usability Scalability System accuracy Compliance policies	42 83 42 25 58 33 42 33
Type of information they want to relate to the customer	Property oversight/ facilities available Cost of properties Number of surrounding schools Number of entertainment centres Local market and shops Reviews Realtors profile Local hospitals Public transport Recreational facilities Neighbours Water access When the property was developed Contract length expected	92 100 50 25 50 42 67 42 50 33 17 33 25 42

Table 4-11 Challenges customers anticipated with the solution

Assessing Internet based solutions generally, 50% respondents said the absence of data protection was a limitation, and 33% said possible loss of competitive advantage was the limitation. When asked about existing real estate solutions, realtors identified long user registration forms, easy navigation on the website, absence of technological skill, preference for manual processes, security of information source, reputation of the information source, search flexibility as the problems that exist with already existing solutions. They were further asked to indicate from a list of options which would serve as a worthy trade of for the cost introduced by online solutions, and 83% said that security both for data and individuals would be a worthy trade-off. Other feature that they considered good enough trade-offs were usability (58%), system accuracy and robustness (42%). It is on this basis that a resolve was

reached that the security of the web-portal is a key focus during development and also an imperative if realtors are going to be comfortable to transact their business on the interface.

The above discussions summarize the realtors' survey using questionnaires. In addition to the questionnaires that were published online, an interview was conducted over the Internet using the Skype collaborative tool. In this survey there were 2participants 1 realtors and 1 lawyer and one property owner. In the next section information gathered from the interview is presented in a narrative.

4.2.3 Interview Narrative

This is a summary of the interview carried out featuring 2 resources persons (See Appendix I for transcribed interview). These resource persons preferred to remain anonymous; however, they did disclose their profession. Amongst the two resources persons, 1 was a realtor and the other a lawyer. Interviewing these resource persons, it was identified that there is a sudden rush of investors into the real estate market. Investments are majorly purchasers as Nigerians view home ownership to be essential. They also mentioned that for realtors who operate in the property business, success is perceived to be "a game of numbers". i.e. the larger your client base the more likely make reasonable profit and the more likely you are going to be hired to do more jobs.

Furthermore, the resource person said they were technology averse because they currently only use the Internet for e-mails and research but would like to do a lot more. They do not currently do all they wish to because of the problem of consistency with other companies who have tried to adopt technology as the core of their business. They gave an insight into what their daily activities encompass and said they would be happy to use and pay for a solution that will avail the following capabilities: -

- View available properties online, see more information on the properties (elaborate detail of property e.g. pictures),
- Be able to judge the security and authenticity of information source.
- Search for a particular kind of property in a specific location
- Know their customers better.
- Have a site to be more active and accessible by realtors regardless of which organization they work for

Consequently, when asked if they thought such solution would reduce their competiveness, they said no, that the issue that might affect competiveness is performance. So if the solution were able to allow customers report and distinguish between performances that it would have

resolved the issue of competitiveness. They further applauded the idea of online customer reviews and said it would be a welcome idea.

Inference from results

From the results of the interview, the solution being developed is not an impediment to competiveness and is capable of meeting the need the resource persons identified. In addition further development is required to allow customers provide information about themselves so that the realtors as well can have some idea of who the customer is. Secondly in subsequent revisions of the portal, research should be done on authenticity measurement in other for users to be able to ascertain the authenticity of information source.

4.3 Summary

In chapter 5, the primary research survey has been discussed in detail, the design, rationale behind the design, hypothesis outlined in section 3.7 from the secondary research and business model development that needed validation were tested and the results analysed. Summarizing, so far the solution proposed as well as the business model is good enough for an initial rollout because the technological capabilities of its users have been established to be above average, their interest to use the solution has been established and also their willingness to pay subscription per annum verified. However some new information that has been gained that does not require extensive research would be included into the solution during the design and implementation stage. Examples include having a facility for customers to provide information about them, paying attention to security and user verification, provision of search flexibility amongst others. In the next chapter, the design of the solution and the process through to implementation is discussed.

5 System Design and Implementation

This chapter discusses the project and development approaches used. The platforms and tools that were used for development are also discussed in this chapter. Breaking down a project into tasks and subtasks makes accomplishing any project quicker and more effective. The granularity makes it easier to develop, manage and also when a problem occurs down the line, it becomes less taking to identify where the error has occurred (Duncan 1996). In the light of the above the activities required to accomplish this project were broken down into tasks and grouped in an order of implementation referred to as phases. For this work, a total of five phases were outlined (see Appendix J). They are initiation, scope definition and requirement gathering, execution, performance control and project closeout.

5.1 Initiation Phase:

The initiation phase was the first phase of this project. At this phase all activities carried out were done with the aim to defining the systems objectives, the solutions scope, purpose and the end product expected of the work. Also, answers were provided for the "*why*" and "*for who*" questions. These question include why is the solution being developed, why is it a worthwhile project who are the target customers and why would they use the solution. In answering these questions, research was conducted on the market, the findings were analysed and similar solutions were analysed. At the end of this phase the deliverable achieved were a problem definition and an opportunity. See sections; 1.1 and 3.3 for detailed report on the deliverable at the end of this phase. After establishing that there was a problem and that the stakeholders had an appetite for a solution project went on to the next phase to answer the "*so what*" question.

5.2 Requirement gathering

The solution is needed so what. Answering the "*so what*", the author investigated further as to complaints users have had concerning existing solutions and what addition they would like to see. A need assessment was also done to identify the best approach to providing a solution. Users were asked about their technological capacity and factors that have discouraged them in the past from using online solution. The requirement gathering activities carried out in this phase was necessary to define what functionalities and eventual output the solution in this work ought to provide. At the end of this stage the deliverable achieved were a solution description, user requirement specification and value propositions. See sections 3.4, 3.6.4, 3.1,

4.2.1, 4.2.2 and 4.2.3 for detail of deliverables. After defining the requirement of the solution, the next phase of the project was to answer the "*then what*" question. I.e. what needs to be developed is known, who to develop for is also known, what they want the system to do for them is known as well. The succeeding question that arose was what's next? Executing the project using all the information gathered.

5.3 Execution phase:

The execution also known as the implementation was the phase where the "*then what*" question was answered i.e. why there is a need for the solution, who has this need, what the solution is intended to achieve, and what features the solution is required to provided. The next issue in line was how to convert all this information into software hence answering the "then what" question. This phase started off by outlining the development requirement. The first step to outlining this requirement was designing the skeletal structure of the solution, which in this work is referred to as system architecture. Next the software requirements were selected, the development methodology defined and then the coding began. The deliverables achieved in this phase are discussed below.

5.3.1 System Architecture

The system will be developed using a multi-tier architecture with an underlying MVC framework. Multi-tier System architecture models the structure of the system in layers and illustrates how the different physical components connect. The importance of structure to software development projects cannot be over-emphasized as software components need to work together seamlessly and be flexible enough to accommodate business processes as they evolve. It also ensures that major requirements are satisfied allowing for scalability of the solution (Garlan 2000). A model of the system architecture has been developed and is illustrated below.

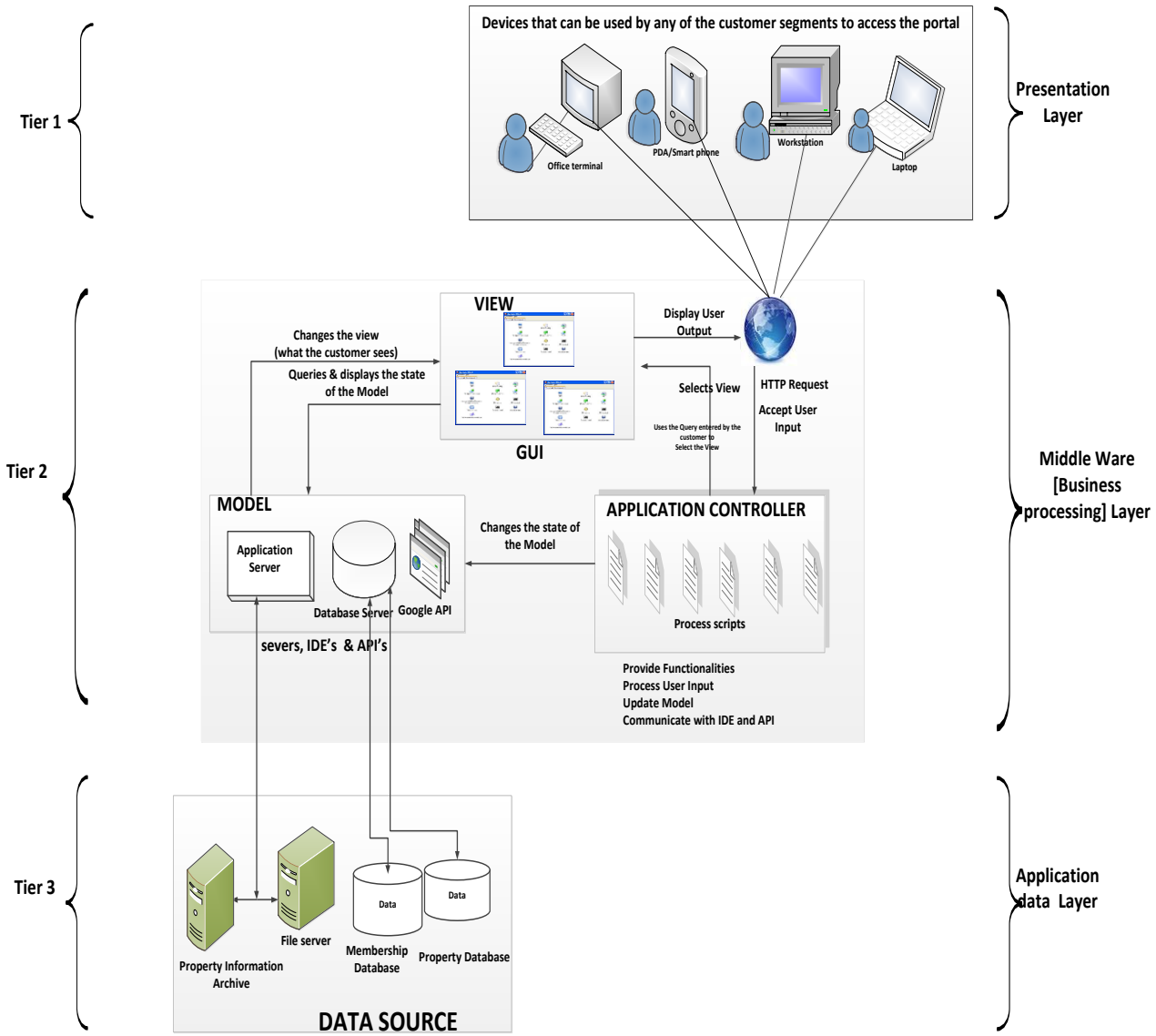


Figure 5-1|| Conceptual Architecture of the System, Inspired by J.Deacon (Deacon 2009)

From the architecture we can see that components of the solution include; databases, file servers at the application layer; user interfaces with which customers will communicate with the system at the presentation layer, and a middle ware that handles interaction between the customer and the knowledge/data/file repository at the business/processing layer. The business layer was further broken down into the MVC structure. The Model-View-Controller (MVC) structure was preferred because compared to the client-server architecture; MVC is modularised i.e. it makes a clear distinction of the processing/business logic, the application data layer and information display (Deacon 2009). The modularisation provided by the MVC based architecture helped ensure that when the system needs to be revised, it would not need to be rebuilt from scratch. Interfaces as well as controllers can be changed independently and the model can be reused for different function or even as a plug-in for a different application

(Razavizadeh & Cˆ 2008). After designing the architecture, it was necessary to identify tools that would be used to build the individual components/building blocks so that they when integrated together they meets the required need. It was for this reason that progress was made to identify the software tools needed for development of the building blocks. The next section discusses the software's selected and provides a brief insight as to why they were selected.

5.3.2 Software Requirement specification

One of the critical success factors for software development is ensuring that the functional requirements as well as the non-functional requirements attain an acceptable balance (Chung et al. 2000). Functional requirements refer to the behavioural characteristics of a system or model being developed (IEEESTD 1984) i.e. It is a specification indicating factors that should be put in place to ensure that the software behaves as desired and is able to yield expected result. The Non-Functional requirements however, deal with rudimentary factors that help ensure that the system performance is accurate. These refer to factors that may pose great difficulty to the success of the system or the business processes it facilitates (Saleh 2004).

Y.Odeh (2009) observed that customers have become increasingly aware and hence concerned about the presence of non-functional requirements of software solution such as security and reliability in addition to functionality (services) provided by the software (YOUSRA ODEH & MOHAMMED ODEH 2009). This view is supported by Boehm's (1987) extensive research on software quality models as reported by M.Haigh (2010). He recorded that although systems do not necessarily need NFRs to produce their desired result, effectiveness is reduced significantly by their absence. He also emphasizes that customers care a great deal about effectiveness of products and services especially in cases of software solutions (Haigh 2010). To this effect, the systems non-functional and functional requirements have been outlined below measures to achieve them are highlighted and discussed briefly.

Non-Functional Requirement: - The NFR for this work was ascertained by measuring what stakeholders consider a worthy trade-off for the adoption of ICT. In section 2.2.10, the author discussed that, when a choice is made to adopt ICT certain issues tend to arise, one of which is cost, others are the digital-divide, inadequate skill, cultural restrictions, effectiveness, sustainability, fraud and poor service delivery. However, cost seemed to be the most prominent as inferred from the literatures reviewed. As a result in the questionnaire that was administered to respondents, one of the question they were asked was "*in some cases, certain features introduce other barriers like cost but may still be considered a worthy trade -off. Tick*

3 features that are most important to you? ". The responses given was summarised in the chart below.

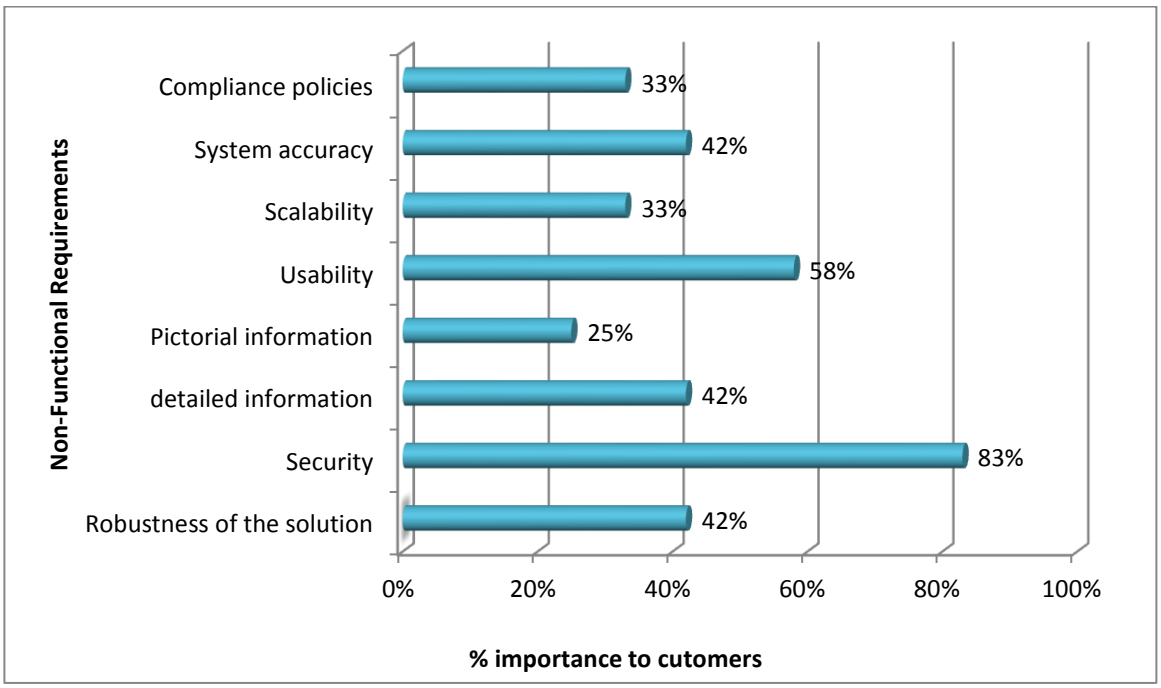


Figure 5-2 Non-Functional requirement assessment result

From the chart, it is evident that the non-functional requirements that are of preference to the customers for this software solution are security, usability, accuracy, and a robust yet stable design platform. These Non-functional requirements influence the selection of development tools specifically because, the business viability of the solution is considered of optimum importance. The non-functional requirements also equip the developer with a lot of skill if they are to be built from inception. However, for efficiency, cost constraints, and to ensure reduced amount of human error as result of short development time, a framework that provides the NFR(Xu et al. 2005) will be used allowing development to focus on the Functional requirements. The framework that will be used is the code-igniter.

Code Igniter Framework: is a widely adopted MVC framework for web solutions development. It is built on using PHP, it provides an extensive set of libraries for use with applications, it has a simple interface but most importantly takes care of the NFR of the solution being developed allowing developers to focus on the actual project (Ellisiab 2008). As depicted in Figure 6-10 in Appendix M, the framework has been designed to handle security checks, routing, scheduling, cache for quick response and lastly role-based access control throughout the portal. Other similar frameworks that exist include the CakePHP and Zend Framework. However code igniter was of preference because the CI because it was free,

easier to learn within the short time available, it was faster to acclimatize to, it wasn't as heavy as the Zend framework i.e. the collection of libraries is lean consisting of only function that are cogent to most web applications (Thorpe 2011). The library is however extensible upon request and had a robust support for other languages like JavaScript, Flash, and HTML, which was used for development in this work. Having selected the development tool that achieves the NFR, focus shifted to identifying what software tools are required to achieve the functional requirements.

Functional Requirements: - functional requirements of the web-portal are factors that ensure that when a real estate customer uses the system, whether to seek for information, search for properties, update their profile, and write a review or contact realtors, the system yields the desired result. They help describe what the system is to do and how it will do it. For adequate functionality, the portal must have business specific forms, adequately designed database schema's, data/information, user interfaces, process scripts, a web server, support for the frameworks used and consistent maintenance of communications links amongst others. The functional requirements that were outlined in section 3.1 were tested while carrying out the primary research. The result is depicted in the chart below

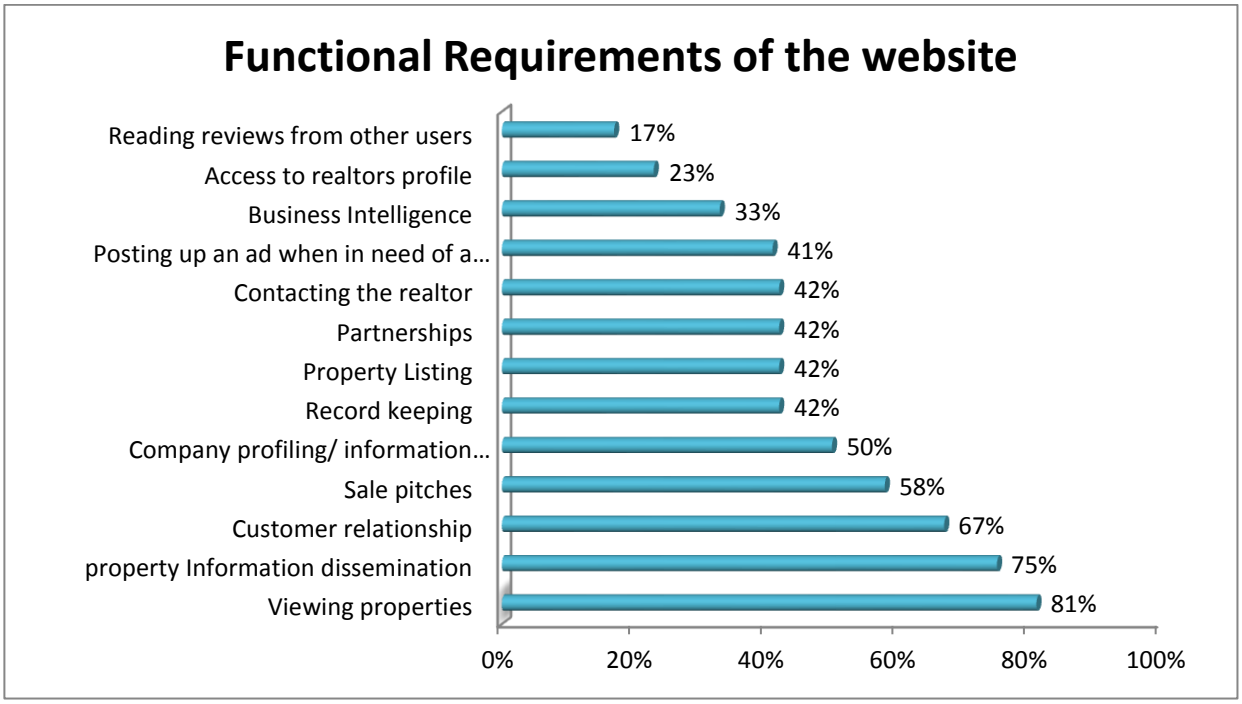


Figure 5-3 Result of preference for defined functional requirements

The inference that was made from the results of the survey was that although all the functional requirements as stated in the user requirement section were important, some were more

desired than others. Hence the order of preference of activities that website should accomplish for the customer was adhered to starting from the most to least preferred as they appear in the chart. To build the functional requirements a framework and certain tools were required. They include; XAMPP server, for efficient communication between the client side and the back end, server side tools are used. The tool that was selected for this project is XAMPP web server. Web servers are a necessity for web based application because they help transcribe scripting languages such as PHP, Python, JavaScript, and Java to produce desired result in HTML format (Bacon 2007). In this case php and JavaScript are the server side languages of choice so XAMMP. XAMMP is an acronym represents Apache, MYSQL, PHP and Perl. It is widely adopted server suit for hosting application on a local server, it is easy to install and configure yet provide very high functionality. It also come pre-installed with other applications like FTP and filezilla that is used to upload/download also has MYSQL server that was used for database development and management. Using the graphical user interface (GUI) provided, it was possible to write SQL queries, access database records, manipulate them and see results. For scripting the PHP, JavaScript and HTML codes, the Notepad++ IDE was used. Notepad ++ is a text based script editor. Other script editors are komodo IDE, NetBeans, and the Eclipse IDE all of which a very good for PHP, HTML and JavaScript programming (Jack Herrington 2006); however Notepad ++ was preferred because it is built using C++ and uses pure Win32 API and STL. The Win32 API and STL enable conciseness of code, higher runtime speed and low usage of computing resource (CPU). After identifying the applications that were used for development, steps are taken to outline a development methodology for the solution. In the next section, the methodology adopted is discussed.

5.3.3 Software development methodology

At the start of this project, three development methodologies were considered. They were the iterative methodology, waterfall methodology and the agile methodology. Developing software solution using the iterative methodology follows a procedure whereby the solution is developed in bits as a series of iteration. The first iteration covers the fundamental requirements, and subsequent iteration build upon that to provide other functionalities or correct errors that have been identified. The waterfall methodology develops software progressively, i.e. concluding a component and moving on to the next without leaving room for changes to be made. If a change on the already developed component were inevitable, it would have to be built from scratch. The Agile methodology however was favoured over the iterative and waterfall methodology and adopted for this project. This was the case because in addition to the fact it is built on the same principle as the iterative model, the agile

methodology is characterized by adaptability. A diagrammatic representation of the agile methodology is given below.

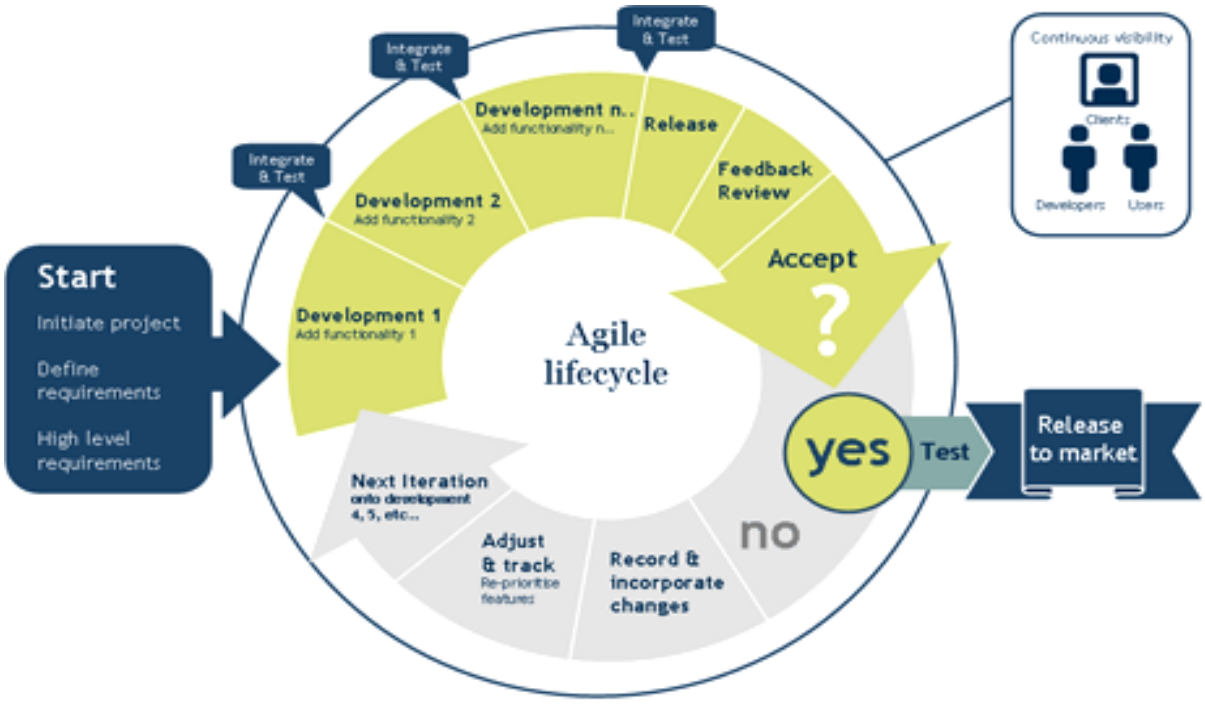


Figure 5-4 Methodology for software Development Source website: www.interviewpenguin.com (InterviewPenguin.com 2012)

The agile methodology was also perceived to be more customers focused i.e. it relies on the feedback from the evaluation of previous prototypes for control of the system. Secondly agile methodology was preferred because it helped break down the development into small manageable bits and a prototype emerges at the end of each of each development task (Serena.com 2004). Once the methodology was defined, development of the user in user interfaces began.

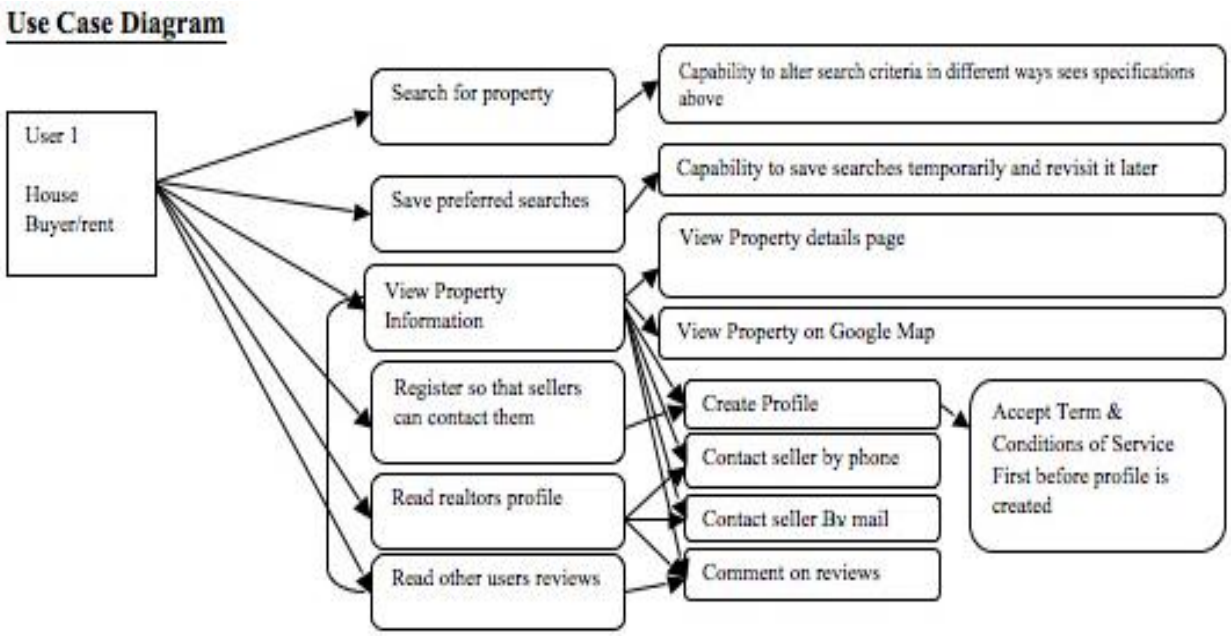
5.3.4 The Portal prototype build

Building the prototype started off by designing the interfaces and forms for login, registration, profile management, reviews and posting up ads (see Appendix K). The interfaces provided made clearer how the database should be designed. Upon completion of the interface and forms design, the database was designed after which building the dashboard commenced. As the individual components were finished they were then integrated together and published on the web. The steps to building the portal further divided into two phase, the first being the development of the web- portal which ran concurrently with the primary research and the second developing the dashboard component

- **Phase 1: Web-Portal Development**: designing the portal, the following activities were carried out. Deploying a web server, building the structure of the portal using the framework (MVC) as illustrated in Figure 5-1. After the structure has been built, development proceeded to building the GUI and Forms (The VIEW), followed by the Model component and eventually the controllers.
- **Phase 2:** Dashboard Design: the dashboard design commenced after the portal was concluded and key performance index of the portal as well as the business had been articulated clearly.

5.3.5 Illustration of operational scenario

Information Search: a user accesses the website and is able to view a random list of available properties displayed on the side panel. These properties are sorted either by location of on the basis of how recent the listings were posted. If the If the user is satisfied with the properties displayed, he/she clicks on the link and continues as instructed by the information system to generate the desired information about a selected property. In the event that the user wants to carry out specific search, he/she is directed to a form where he/she enters the parameters for choice properties, the search is performed and results returned. From the list of properties returned the user could then investigate further by clicking respective links to view the dashboard representation of information. They can also register to have realtors contact them.



List 5-1 Illustrative scenario of Information search and feedback request

Service Access: The user is also provided with the option of registering on the system. If he/she decides to register, upon completion, more functions are made available to such user. These functions include realtor service review, save daily search, property portfolio creation (selling customer), resume upload (selling customer), access to property packages and property discussion room. The user depending on if he is a seller is availed the privilege to have customers who are interested in their property contact them. I.e. the buyer has access to their phone number and email address and can use either to send them a message indicating interest in their property. They can also access some of the information managed in the administrative section with limited access. An example would be a summary of user property preferences. This administrator collates this summary for the purpose of providing business intelligence to interested clients.

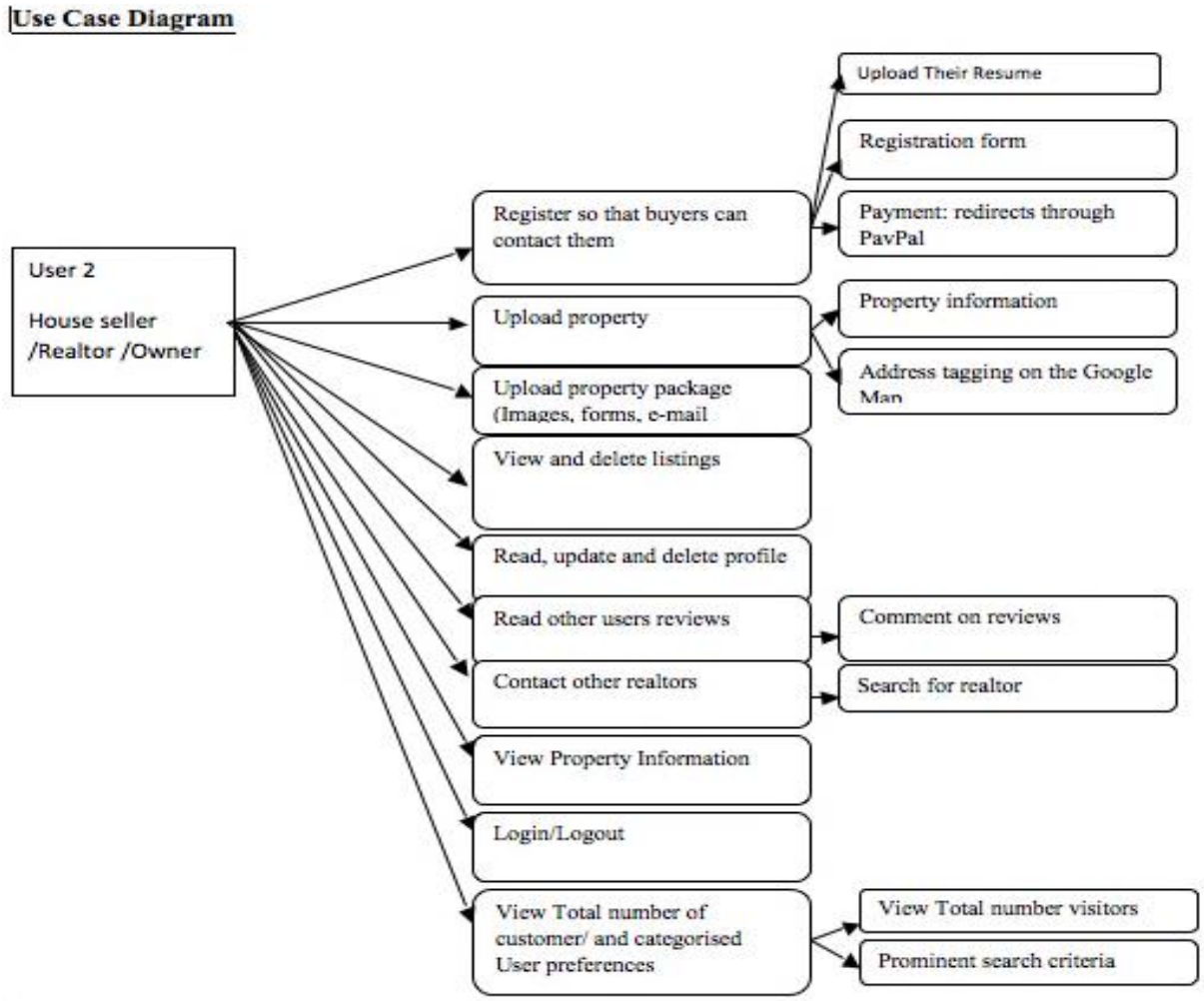


Figure 5-5 Illustrative scenario of service access as a realtor/seller

The flow diagram below explains further the information flow by design that can occur throughout the system. Other activities that can also be carried out using the portal are depicted in the flow chart.

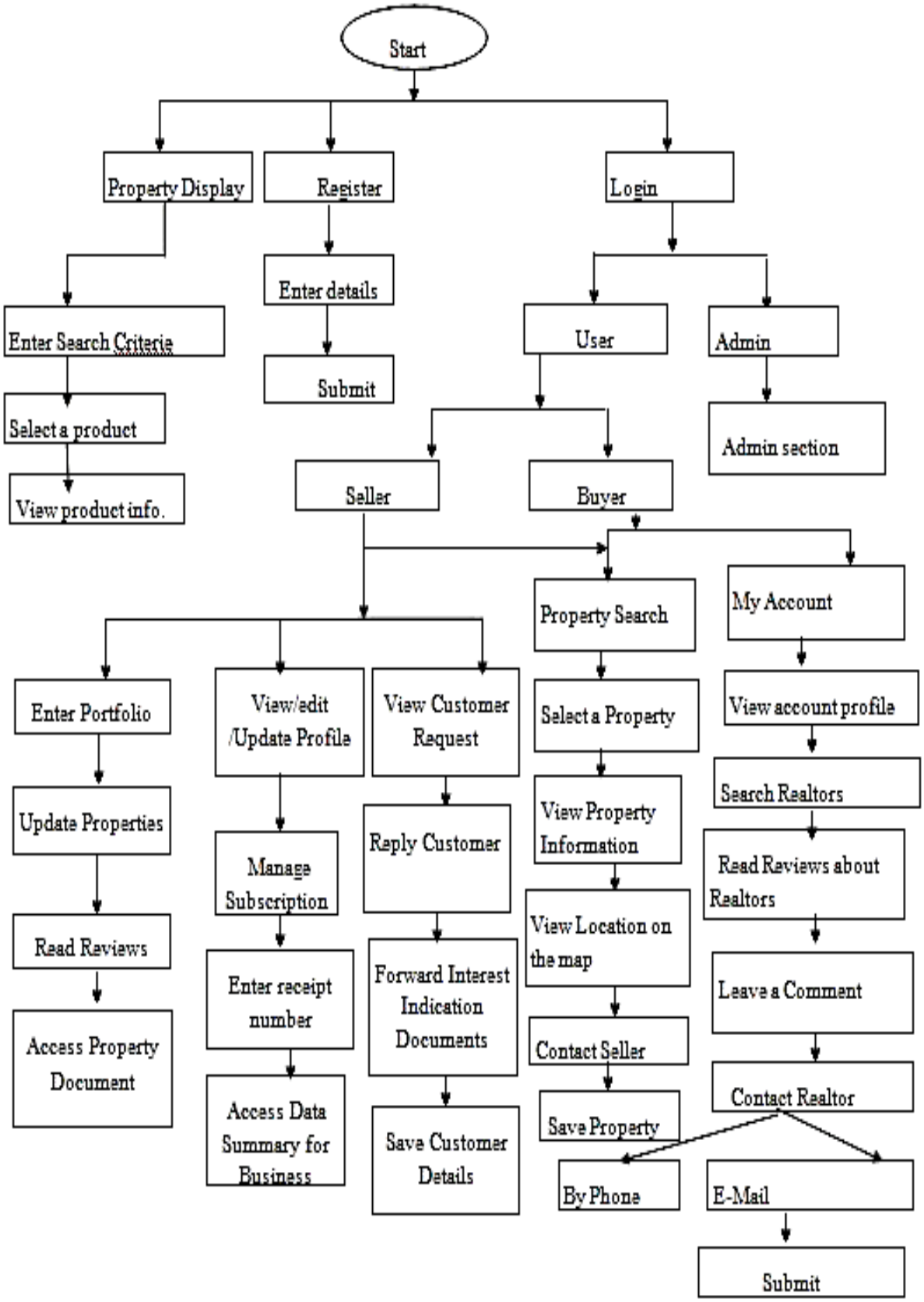


Figure 5-6 Flow Chart Diagram showing information flow in the portal design.

Upon completion of the execution phase and sub-phases, the project proceeded to the performance and control phase using the result of the primary research as well as testing the ready product

5.4 Testing and Evaluation

Software testing is a very significant part of software development lifecycle. It certifies that the solution developed is of the customers desired standard and coherent with a business's objective (Khan 2010). Ensuring that a system performs as is expected is a necessity for business success. Typically in a country like Nigeria who's economy is still developing. When solutions are not tested for quality assurance, they can have high cost implication by impacting customer's perception of the service provided. Similar occurrence of the negative implication of ignoring software testing was recorded in the United States. According to Schechner, the presence of bugs in software's cost the US, 0.6% of their GDP amounting to approximately 59.5 million dollars. She argued that half this amount could have been saved by just implementing software test and quality assurance procedures (Schechner 2008). On this premise, investigations on techniques to test software were made. It was discovered that there a four major types of software testing, each of them having one or more sub-techniques. The summary of the different types of techniques is represented in the diagram below.

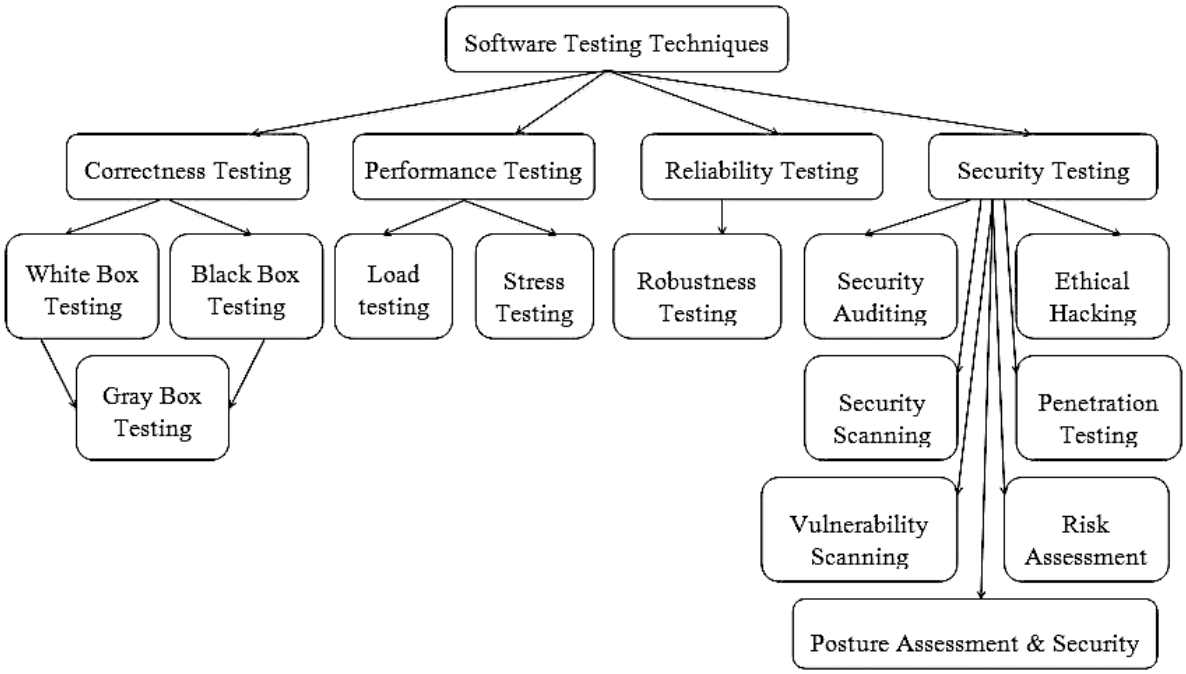


Figure 5-7 Software Testing techniques and sub-techniques (Khan 2010)**,** (Schechner 2008)

From the diagram above, the second layer indicates what the different types/aims of software might be and the lower layers show techniques that can be used to achieve such aim. Mohd'

Khan was of the opinion that the most essential types of test and minimum requirement for any software is its correctness (Khan 2010). If the software is correct, then it can be tested for performance, reliability and security. The author was of the opinion that the testing technique adopted should be determined by which is serving the customer. These two opinions come to a convergence when considering Khan's argument that the ideas of the white/black and grey box testing techniques are not limited to correctness testing. The convergent point between both opinions is that if a product has to serve the customer it has to be first correct. Also in testing that the solution is correct, the performance and reliability can also be tested. Further more in this project, only the first prototype has been developed the appropriate course of action would be to test for correctness of the solution. Correctness testing involves the use of one or more techniques to distinguish the expected system function from the wrong one. It also helps identify specifically what can be done to improve the wrong function (Pan 1999). In the next section the selected technique/s for correctness testing will be discussed further

5.4.1 Correctness Testing Technique adopted for the prototype

There are 3 techniques for testing correctness as depicted in Figure 5-7; the white box testing is a technique that focuses analysis on the internal operation of the software or system being assessed. It involves imputing values into the system and monitoring to see that the expected output is generated (Schechner 2008). The black box testing on the other hand is a technique that focuses analysis on the fundamental aspect of the system. When testing software's using the black box technique focus is shifted from the logical/internal process of the system. The set requirement is only used to test that in developing the system all the requirements have been achieved. That is as opposed to checking that the right output is generated, it checks that input is received as stipulated and output generated likewise. When carrying out a black box test, it is therefore not necessary to involve users of the system (Sawant et al. 2012). Of interest in this work is the grey box testing. This is the case because the grey box testing technique combines the underlying ideals of both the black and white box technique (Khan 2010). The inference is that using the Grey Box Testing technique, it becomes possible to assess both the internal logic of the system and the fundamental aspects as defined in the system requirement all at once. It is however worthy of note that the grey testing method does not over emphasize any of the aspect of the system over another like the black and white. However is provides an acceptable assessment for all aspects of the system being considered (Sawant et al. 2012). Assessing the fundamental aspect of the system, several cases scenarios were attempted and the summary of fundamental test is shown in the table below.

REQUIREMENTS	Compulsory	Essential	Bonus	STATTUS
Flexibility with search criteria		☑		✓
Speed/response time	☑			✓
Ease of navigation	☑			✓
Brief registration form	☑			✓
Security		☑		✓
Mapping	☑			✓
Seller type specification		☑		✓
Universal Access	☑			✓
Realtors Profile	☑			✓
Search Facility	☑			✓
Saved Searches	☑			✓
Library of Images		☑		✓
Sorting Function	☑			✓
E-mail Agent/Facility		☑	☑	✓
E-mail follow-up		☑		✕
Easy Navigation	☑			✓
Absence of clutter	☑			✓
Flexible Property Type		☑		
Request for property		☑		✓
Outline of available facilities in the property	☑			✓
Advertisements			☑	✕

Table 5-1 Testing result of fundamental aspect of system (Black Box type technique)

The representation on the table show that when the system was tested using different case scenarios of output and input to identify if it function as defined, all the requirements that were marked positive "✓" in the status column were evidenced to have worked in accordance with specified requirement. On the other hand, the requirements marked "X" were yet to function as anticipated. Hence in the next review phase of the portal focus would be placed on verifying why these requirements did not function properly. Having assessed the fundamental aspect of the system, steps were taking to further assess that the system logic is correct. The procedure was to develop a brief questionnaire, which users who tested the system filled after their first interaction with the system. The questionnaire asked a total of five questions, the results of the system logic assessment is provided in the next section

5.4.2 Prototype Evaluation Results

To evaluate the logic of the system, 5 representatives were selected and asked to carry out a series of actions. Five scenarios were designed to test the system logic. These 5 scenarios were considered sufficient because the grey box testing techniques is what is being adopted for this work. Also the grey box testing inculcates the underlying procedure of white box testing (system logic), it does not carry out this test as extensively as the white box technique. It only

provides a general overview of the system logic correctness. The scenarios that were presented to the users were;

- Scenario 1: Users were asked if they understand what the website is intended to do
- Scenario 2: Search for a preferred type of property and contact the seller
- Scenario 3: Upload properties and enter the property information
- Scenario 4: Register, login, locate your profile and perform any action
- Scenario 5: Write a review about a realtor's service and read other reviews

For each activity, a strict 5-minute time was allotted. The essence of putting a time restriction was to have a qualitative assessment of how easy it as to understand adapt to and use the system. It also helped estimate the response time on the system. At the end of each activity, the users were required to give a rating of 0 – 100% on how easy and effectively they were able to carry out these activities, if the result the system generated was what they expected and raise any issues they encountered that they would like corrected

Scenarios	User 1 (Buyer)	User 2 (Buyer)	User 3 (Semi-skilled Realtor)	User 4 (Private Seller)	User 5 (Realtor)	Issues Raised
1	95	80	75	90	99	Some descriptive information should have been provided to improve perception
2	100	90	90	85	100	Overall simple but functional solution, however it would be able to nice to search for finance opportunities as well
3	0	0	50	65	75	Could not find the function
4	60	70	65	75	75	The links to Homepage and account management should be more visible
5	80	90	0	0	0	Could not find the function

Table 5-2 User perception of the prototype

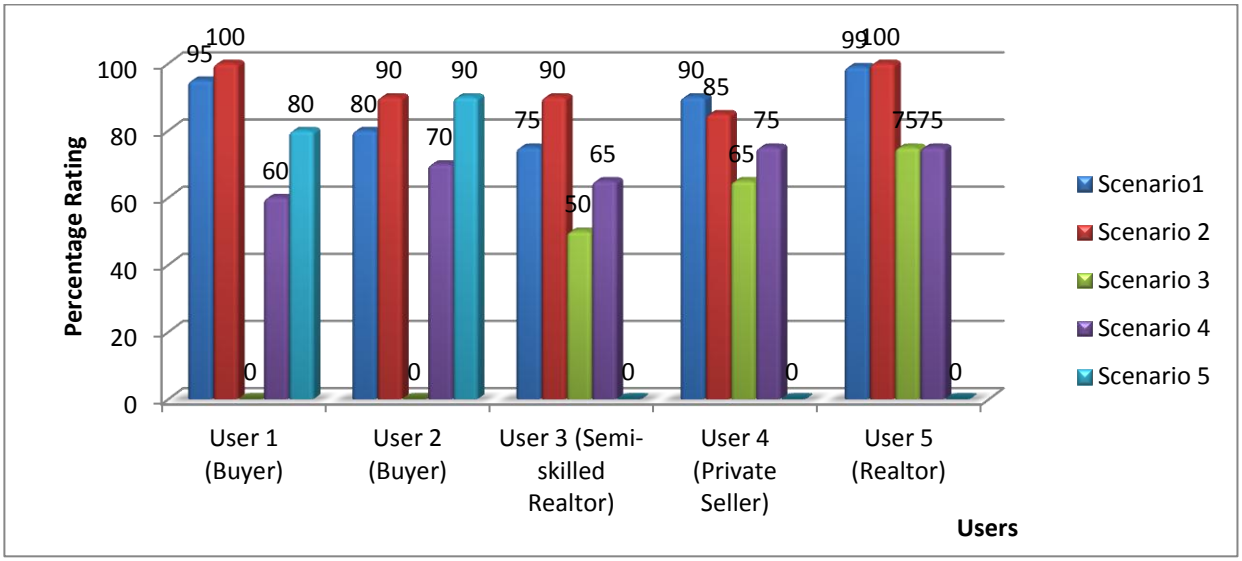


Figure 5-8 Chart representation of user perception of prototype

Looking at the ratings giving for all scenarios, users had an above average value for each activity, this indicated that in the space of time allotted to them they were able to find out how to use the system and use it. However with scenarios 3 and 5, it was noticed that some users rated their experience carrying out the activity 0. The cause of their difficulty is attributed to the role based access control implemented in the system to help ensure security. I.e. users can only carry out activities specific to their user types. Considering scenario 3, the activity is one specific to realtors/seller while scenario 5 is specific to buyers. However all participants were encouraged to attempt this activity because it helped validate that the system produced the right result when the activity was completed and restricted a user from carrying an activity that was not allowed for his/her user group.

Issues raised and attempts made to correct them

1. **Understanding of the Website – Home Page:-** Evaluators on first contact with the web-portal were of the opinion that all they can do is search for houses.

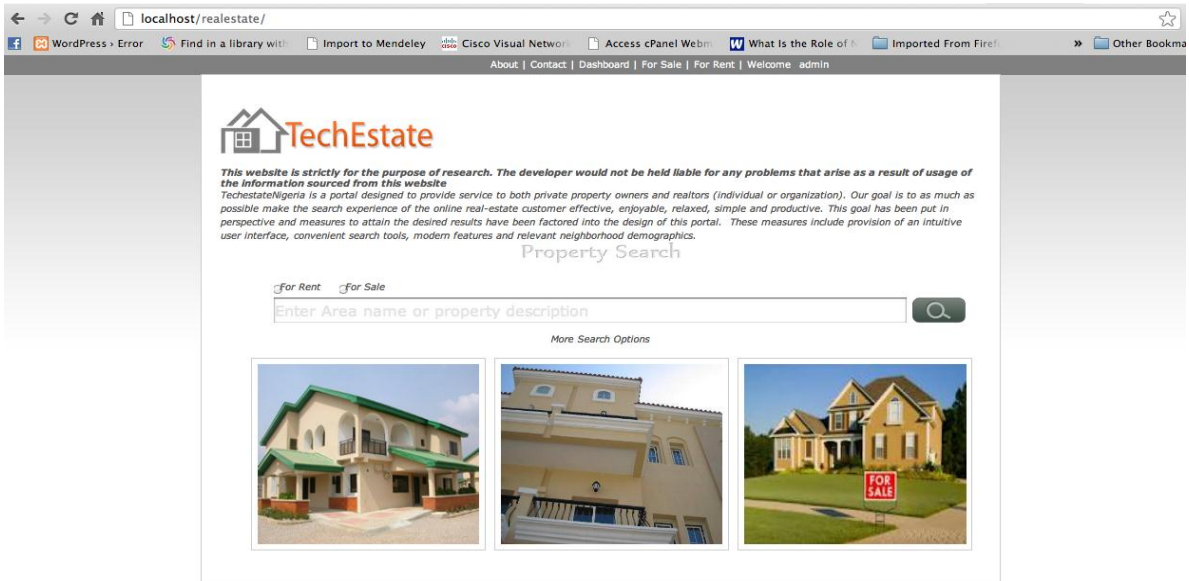


Figure 5-9 Portal Home Page

- **Action taken to correct issue: -** provision of a user guideline. When provided with information as to how much they can achieve using the portal, they suggested that it would be necessary to pass similar message on to all customers who come in contact with the portal. They stated that they liked the fact that the pages were not too busy, however they further suggested that a good avenue to pass on same message without cluttering the portal would be to develop a flash tutorial of a series of images that directs the user explaining to him/her what functionalities are provided on the portal. They also mentioned that a site map would also be necessary for providing guidance around the portal.

2. **Post Listing: -** During the evaluation of the system, testers who evaluated the portal on a basic membership account complained that they were unable to carry out certain actions. An example in scenario 3, they were unable upload properties because the feature was not activated. They said that there was a possibility that they were both buyers and sellers and would not to manage two accounts.

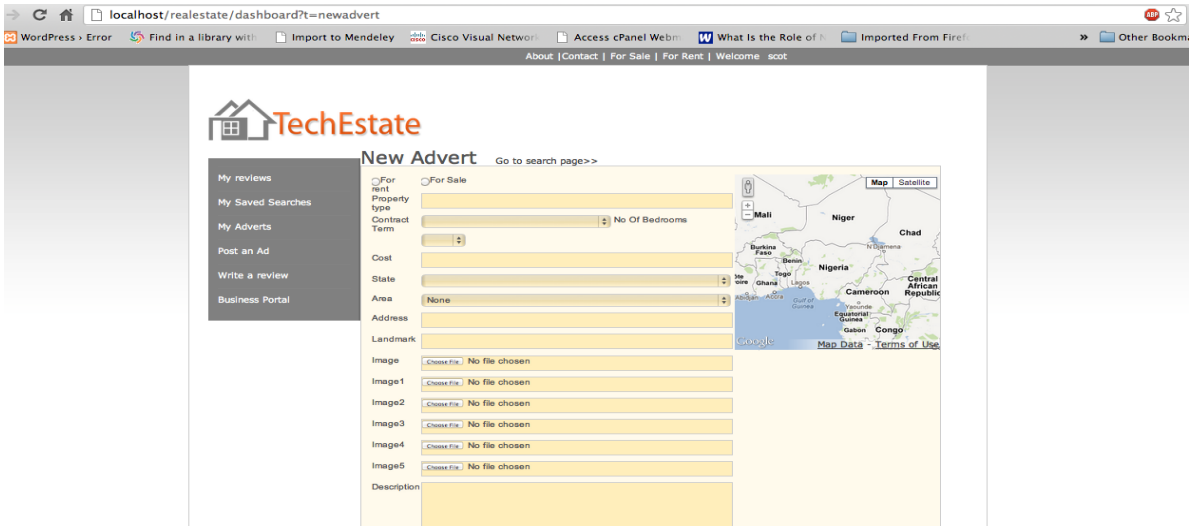


Figure 5-10 Portal add property page

- **<u>Action taken to correct issue: -</u>** This complaint arose because the user was using a basic membership account that had been pre-programmed to deactivate seller specific features. The role based access control implemented when developing the system was an extra security feature to ensure that user only carry out specific activities that they are authorized to. The evaluator was further advice to upgrade in his profile management section and retry the same activity. After the upgrade the property form became accessible and the user could upload their property. The figure below shows the account upgrade page.

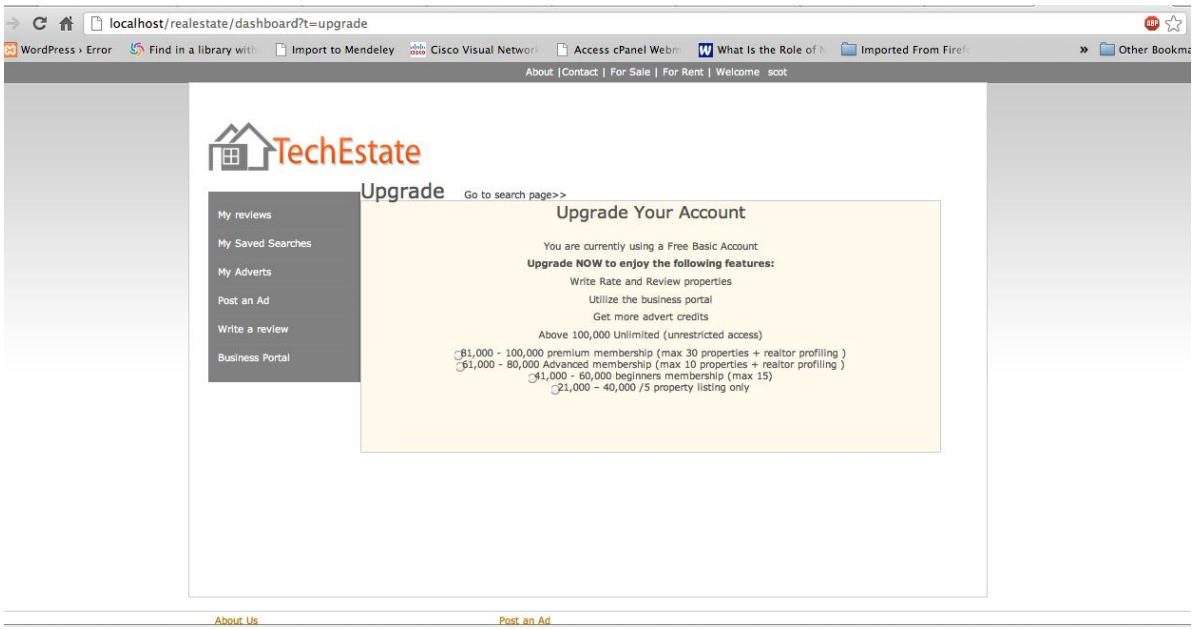


Figure 5-11 Upgrade membership Page

3. **Mapping:-** when viewing properties, users would have liked to see the exact location of the house as opposed to seeing the street or a close by landmark.

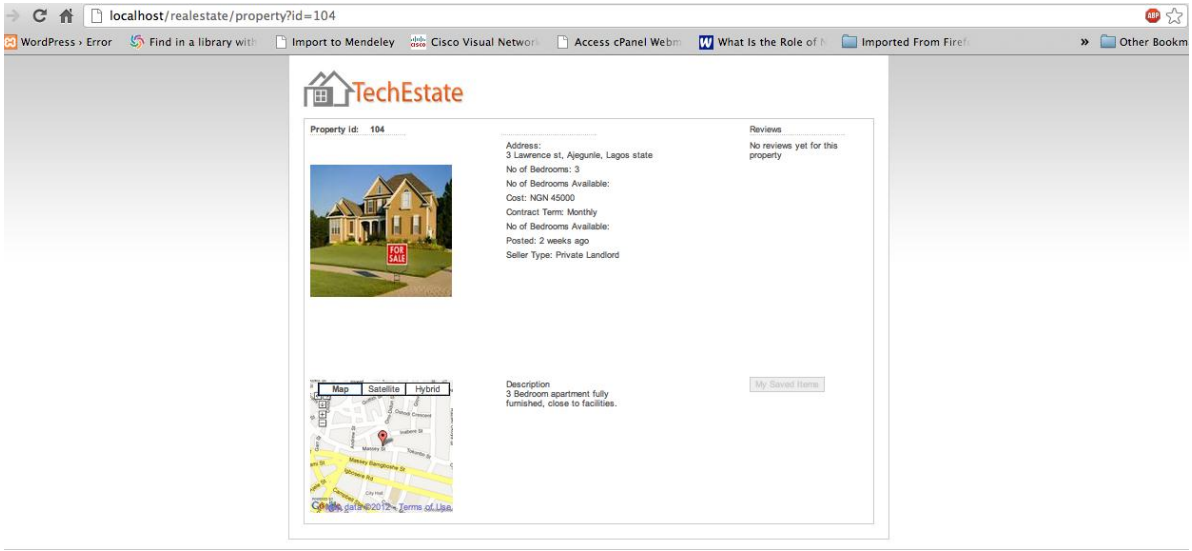


Figure 5-12 View property details

- **<u>Action taken to correct issue: -</u>** they were informed that the reason for the mapping logic used was because of the difficulty posed with the addressing system in Nigeria. However in the next prototype further research would have been carried out to find better ways geo-locating properties on a map with maximum accuracy or proximity as the case may be.

4. **<u>Reviews:</u>** Realtor representative who assessed the system complained of being unable to write a review about a fellow seller or their property. That is the review form was deactivated in their account.

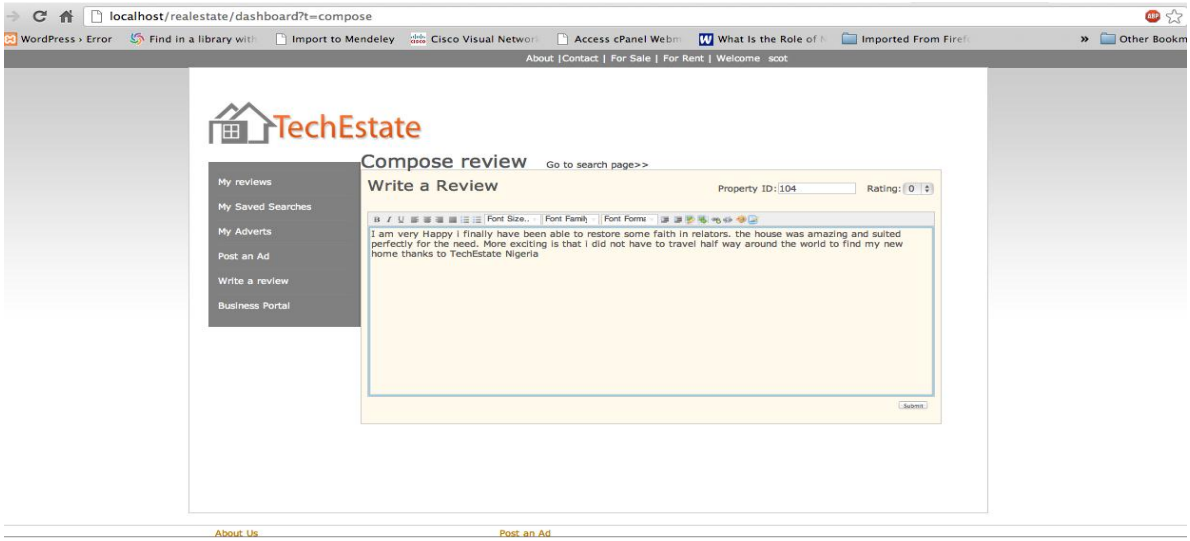


Figure 5-13 Write a review page

- **Action taken to correct issue: -** explanation was provided that these restrictions were put in place such that seller in a bid to out- perform their competitors does not post derogatory reviews about other sellers or post reviews about their own work. However provision was then made for them to post their reviews about properties.

Other issues raised were:-

5. Addressing: users requested format for addressing should be defined so that they know what is expected when uploading properties.
   - **Action taken to correct issue:-** provision of an example address beside the address field. In the next prototype however text boxes requiring specific inputs will be used to replace the address field.
6. **Link to Home page:** users identified a design error that no link was provided to redirect back to the home page. A user would have to keep using the back button in the browser. They also indicated that the account information link should be more prominent.
   - **Action taken to correct issue:-** a "Home" link was included.

Finally they were asked to rate the overall performance of the website in comparison to the competitors previously identified. The results of their rating are presented in the table below. For uniformity in assessment scores, the same range of values used to assess the competitors in section 3.2 was provided to the assessors alongside a brief explanation. The range 0-5 was used for the assessment (1= absent, 2= undecided due to access limitation, 3= present but inactive, 4=present and active but not easily accessible, 5=present and active) and the performance of each web-portal calculated.

S/N	Criteria	Castleweekly.com	Ip4properties.com	Nigeriapropertycentre.com	Propertiesng.com	Naijaproperties.com	Axorahomes.com	www.TechEstateNigeria.com
1	**Mapping**	1	1	5	1	1	1	3
2	**Seller Type specification**	1	1	2	4	1	1	5
3	**Universal Access**	2	1	5	5	1	3	5
4	**Realtors Profile**	3	3	1	1	1	1	5
5	**Search Facility**	5	2	4	5	5	1	5
6	**Saved Searches**	1	5	1	4	1	2	5
7	**Library of Images**	2	3	5	5	3	1	5
8	**Sorting Function**	1	2	4	3	1	3	4
9	**E-mail Agent**	5	1	4	4	5	1	4
10	**E-mail follow-up**	1	1	1	4	5	2	2
11	**Easy Navigation**	4	5	5	4	2	5	5
12	**Absence of clutter**	1	4	4	3	2	2	5
13	**Flexible Property Type**	3	4	4	2	1	4	5
14	**User Request for Shared renting**	1	1	4	2	2	1	5
15	**Availability of Service Listings**	1	1	1	1	1	1	5
		32	**35**	**50**	**48**	**32**	**29**	**76**

Table 5-3 Results of solution assessment by users reported side-by-side with competitor analysis

The table above shows a summary of user overall evaluation of the web-portal. The table entry in red font show the average value users attached to the portal on each criteria, The results were then placed side-by-side with the previous assessment dome on competitors to see how well the portal has performed. From the table above it is therefore evidence that the portal is a solution that is preferred to all identified competitors. The preference margin is determined by subtracting the value of the highest scoring competitor from the portals score. I.e. 76-50 = 26. This shows significant difference between the best-rated competitor and the solution developed in this work. It was however resolved that areas although the solution performs adequately, areas that were rated lower that the maximum possible rating should be improved to maintain competiveness in the near future.

5.5 Project close out

At the end of the project, product appraisal was done. Approaches used were reflected upon and evaluated to help identify improvements that could be made. The resolve formed the author's recommendation for further study discussed in the next chapter.

6 Conclusion

This work focused on the application of technology to real estate business in Nigeria. Having extensively looked at the market to understand present situation and identify areas that require improvement. Information availability was selected as an entry point for technology application. The Nigerian online market was further analysed in comparison to developed economies, it was deduced that information availability, presentation, reliability and usability would go a long way to promote the real estate business. It is on this premise that developing web-based information system was decided on. To ensure the solution meets standard and suitably serves the proposed customers/stakeholders the market was analysed and a requirement specification put forward. In developing the user requirement specification some assumptions were made based on the market analysis previously done. These assumptions were further used as base information to develop a business model. The business model for this solution combined 3 online business models together and they are advertising, infomediary and subscription. These three models were combined because the first takes care of the approach to service offering, the second information provision and gathering for business intelligence and the third how the business generates it revenue. The business model also highlighted that the niche the solution has created for itself is that it is the first universally accessible platform with avenue to enlist flexible housing alternatives. Having drawn up the business model, there was evident promise of value for all stakeholders. Hence further action was geared towards building the solution. The first of which was carrying out a primary research. The assumptions made from the analysis required that they be tested and validated. Also it was necessary to test the viability of this solution as a business. These formed the focal point of the primary research. During primary research, it was discovered from the results that although a unanimously accessible information system would be viable for the real estate business, customers would be more inclined to use the solution if their information is secure and the system does not expose them to fraud. Also realtors in the industry raised the issue of reviews. They suggested that the availability of reviews on the portal would help maintain their competitive advantage. That is when they have performed adequately; the customer can spread the word to other people who need their services. It was further discovered that regardless of the few but key challenges that might arise during development or in the future, they all come under the acceptable risk threshold. This allows the business a promise of return on investment, customer satisfaction and a good brand identity.

Project execution continued by specifying requirements that the product must meet if it is to be efficient in addressing the information need. Some of these are Usability, accuracy; refresh

rate, flexibility, and security. These requirements were then taken into consideration, and the portal was built using well-researched and standardized methodologies for development of the solution architecture, implementation plan and structure modelling and the final prototype.

Finally, the portal has been tested and users have rated it higher than all existing similar solutions in the Nigerian online real estate market. Also from an information technology standpoint, the author emphasises that the most effective solution to the information provision need is the provision of a web-based information system. This is the case because all the other options that exist in developed economies, Nigerian market has not matured reasonably to use such solution and reap the benefits properly.

6.1 Achievements

At the end of this work several achievements have been made. A list of the achievements made include:-

1. An in-depth understanding of the real estate market in Nigeria as well as its market trends was acquired. The understanding about the industry was built from the perspective of a customer, a realtor and an online business.
2. Knowledge has been gained on factors that have made the real estate sector in developed economies to thrive.
3. The pros and cons of adopting similar practices in Nigeria have been identified
4. Knowledge of all the stakeholder that participate and in some cases drive market value was gained
5. The different needs of these stakeholders and ways in which they can be addressed was researched
6. An online business model, suitable for the real estate market in Nigerian was proposed. Not only was this business model suitable, it was tested and all the stakeholders involved approved of it.
7. A prototype of a solution to the need identified in the NREM was developed
8. Experience with using developmental tools, knowledge of how they operate and best practices for implementing them was acquired.
9. Enhanced research capability, result interpretation, and advanced ability to work independently have been acquired.
10. Skills to identify and overcome limitations when they occur whilst making the most of the resources available have enhanced.
11. Another key achievement made is the ability to critically investigate and outline areas that require further investigation.

6.2 Project Limitations

Having concluded this dissertation, reflections commenced on all the activities that made it possible to reach this stage of the project. Reflecting back on activities, several limitations were identified. This limitations had they been absent, achieving the project would have been easier, faster, more effective and the end results of impeccable quality. The different limitations that were encountered during the process are discussed in this section.

The first of which was experienced whilst carrying out the background research. During the background research it was discovered that a very severe hindrance in the provision of valid information to buyers was because relevant source prefer or have a habit of hoarding information and only making it available at exorbitant prices. Had this limitation not existed, the author would have investigated ways to grant respective authorities access to the portal or at least integrated the portal to their information systems so that they can input valid information concerning the properties that the seller post on the portal. This would have increased the customer's trust and confidence in the system and made them more inclined to use it.

The second limitation was experienced when attempts were made to understand the supply chain of the market. Investigating the supply chain of the real estate market, a semi-structured market was identified. Had the market been better structured, it would have helped to better design and channel the business strategy. It would also have been useful in identifying the dynamics or changes that are anticipated with the market and the business set up to stand the test of time.

The third limitation was identified with measures used to achieve the primary research. Time, cost and collocation of the author had some impact on the primary research. If the author was present in the country for which the solution was developed, the primary research would have been more effective, as responses would have been received from a larger sample of market participants, it would have been easier and more cost effective to acquire this responses within the limited time and most of all, the author would have been able to communicate better the concepts behind the ideas being investigated in the research. Also some form of qualitative assessment would have been gathered from each respondent had they the opportunity to communicate with the author.

Finally with developing the portal, time to project completion was another limitation. After gathering all information and defining the user as well as system requirement, the

development work that had to be done was enormous. This was the case because if the system was going to serve customers buying a house, it had to serve customers selling as well. And these two customer segments had different need as gathered from the needs assessment and different appetite for fulfilling this need. The implication hence is that even the first prototype had to focus on all concerned stakeholders, building something that they can use and in addition has a promise of value for each one of them within a short development time. In spite of this however, adopting the agile development methodology was very useful. Another difficulty with development was providing the Geolocation of the properties posted on the portal automatically interfacing the address with a map. Of the entire map API researched, the Google maps emerged the most extensive. However the lack of uniformity in the addressing system in Nigeria translated into the absence of Geolocation of properties using the specific address on the Google maps. The author however found a way around this by using landmarks that are displayed on the Google map. Had there been a more uniform addressing system in Nigeria, it is assumed that t would have been possible to locate individual houses on the map making for faster development time and more accurate environmental information. In the next section the author goes on to make suggestions as areas that need to be further researched.

6.3 Recommendations for further Research

Also having looked at the technologies that are in existence in developed economies, and understanding the benefits as well as consequence involved in doing so. The following are the technologies that are presently not in use in Nigeria and would be credible areas for further research:-

- **Authenticity Verification:-** From the primary research it was discovered that the customers would very much like to ascertain the authenticity of their information sources. This creates an opportunity for further research as methods of calculating or estimating information source authenticity.
- **Environmental Information:-** one of the features the portal was intended to provide the user with was environmental data. However for time constraint development did not reach that stage. Subsequently, further research can be made to identify ways to compute this information and make them available to the users.
- **Pictorial co-location on a map and Search enabled map:** one of the ways identified that users would like to gather their property information would be by searching directly on the map just clicking areas. This desire of customers leads to the recommendation that further study can be made in the area of search enable maps and pictorial representation on the map
- **Map Addressing:** developing a mapping API specifically suited for the Nigerian addressing system such that environmental information about housing can be easily gathered using software's as opposed to a drive through.
- **QR-Codes**: The adaptation of QR codes compared other technologies seems highly promising as user will not be requiring internet connectivity subscription separately from that which they already have via their mobile service provider. Hence researching ways in which QR codes can successfully penetrate the real estate market will be a worthwhile venture especially with the growth of smart phone usage. Also to implement such technology it would require a supporting business which focuses on generating these codes, managing them to ensure that its introduction is not exploited for different purposes from why it was developed or even crime. At present no such business exists in Nigeria, thus posing high barriers to entry as such services would have to be imported as well as the human resource to manage it. It would also be a good area or research if ways of developing and managing this QR codes by indigenous companies.

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APPENDIXES

Appendix A: Additional information on NREM

Sources of Real estate financing in NREM

Sources of housing finance now include the:-

Source	Explanation
Federal mortgage banks	Banks developed for the sole purpose of issuing long-term credit to citizens (Moss 2003)
Pension fund	A build-up of funds received from employees which they can access after they have retired
Development banks	Banks instituted to grant long term finance for industrialization, commercialization and real estate development,
Universal banks	Retail banks that have the capability to only provide for short-term loans comprise
Contractor financed	Private sector property financing either as individual or as a group of investors (Okoroafor 2007)
Corporate bodies	Companies provide monetary facility towards addressing the housing need of their employees (Kundu 1993)

Figure 6-1Alternative sources of property financing

Another source of funding is personal financing. This is when the customer embarks on saving towards the procurement of properties of interest (Ndubueze 2009). The savings are either made in a bank, progressive investment in a business venture such as equity stakes in companies, stock-market in a bid to grow the investment (Udechukwu 2008).

Appendix B: Discussions on NREM Environmental Variables

Porter's 5 Forces

Industry competition

The real estate market has been in a turbulent situation for reasonable amount of time and will continue to be so until the imbalance between housing provision and population is resolved. In the course of research, it was discovered that amidst the attempts that have been made to resolve the issues identified in section 33, Competition in the industry is still very high because there is a steady growth of the industry in an attempt to cater to the housing need. Currently, finance organization, real estate firms, public sector, private investors and even semi-skilled realtors; all these players are actively involved in real estate as a business and hence compete for market share in terms of their customers and revenue. Intensity in the market is further introduced because most of power hierarchy that exist amongst these players. This power hierarchy translates to trust and confidence in the service provided but also high cost of the service. Whilst the players at the lower power levels offer more affordable service with relatively lower trust in service provided. Another issue that introduces rivalry in the market is branding. The prominence gained by some realtor organization over time is evident by the number or properties entrusted to them to manage. There is also high rivalry because of the cost of switching between service providers and having to rebuild relationships. Up-upcoming organization strive to out-perform them by their service offering, either by service differentiation or by providing the same service at a cheaper rate in other to gain recognition.

As part of the efforts at achieving service differentiation, many realtor organizations have adopted is the automation of their processes. Some have developed web-profiles, other participate in the use of social medial interfaces and the one who have an active presence on the web are those who have taken real estate retail and transformed it into real estate e-commerce by developing platforms that achieve the above.

On the contrary when the real estate sector is separated on basis of services offered, rivalry is reduced. This is the case because the Nigerian real estate industry comprises of various players with varying products. These players include construction/ developers, raw materials providers, policy maker/ regulatory organizations, legal entities (lawyers), banks/finance institutions who provide credit and finally the property managers/realtors each of which have specific service critical to their business operation. Although in some cases they tend to provide a service particular to a different sector from theirs, in such cases be it information on properties, finance or legal advice, it is usually subjective. In that it is constrained to the

business handling of that particular organization. The industry is growing and for this growth to occur, there needs to be a unanimous platform that can provide, if not all, majority of the service offered in the industry

Suppliers Power: - these refer to authority service suppliers wield that can be used to influence the price of such service offered in the market. Supplier power is relatively low because there are an enormous number of suppliers so much so that individuals are part of the supplier chain. The ability of the supplier is also restrained because of the fact that there is a tendency for one service provider to offer another service as a bonus (Micheal E. Porter 2008). An example will be realtors who include in their customer package the option of a legal advice or financial packages. Another significant reason why suppliers have low bargaining power is because semi-skilled service providers who's service offering are charged on basis on their personal predicament (O. Olatoye 2011) i.e. (how often they need money) these semi-skilled service providers will offer a service at any cost to the customer willing to pay their fees. More often they go extra-length to ensure that their service is of some quality or at least a properly feigned quality good enough to convince their customer. Another reason why suppliers have low power is that in an environment like Nigeria (Developing); service differentiation is only as appreciated as perceived by the customer. Most service providers tend to be more interested in transacting business (getting paid), to repay their mortgage, get their percentage of the revenue generated or recover their investments than they are in serving the customer. The implication of this it that becomes difficult to distinguish between the good and the bad service provider.

There are occasion when suppliers may have high bargaining power. This is only possible when several suppliers from different sectors or even the same sector come together to offer their services as a complete package. They become a formidable force on the market as such services are usually perceived to be more cost effective, easier to manage and easily retractable should there be a need to do so.

Bargaining Power of Buyers

This is a measure of how much pressure the customers can apply to the market forcing the suppliers to reduce their prices. Although the fact that suppliers have relatively low bargaining power should shift the bargaining power to buyers (Inderst & Mazzarotto 2009), trends show that, buyers in the real estate market have low bargaining power. This is the case because even though there are many suppliers, there are even more buyers and yet a shortage of the

properties their services surround. The steady trend of housing deficit, a population growth and the criticality of housing to livelihood greatly constrain the ability of the buyer to affect the service price either by withholding demand or forcing down prices by any other means. Alternatives buyers consider is having to gather the information they require by themselves, this option is usually more time consuming, in some cases more expensive, it is also error prone owing to their lack of experience (if they are first time buyers) and they may also be exposed to fraud. Fraudulent service offerings which generally come at a lower cost, although they seem attractive, when the round-trip cost of a good like housing is considered, buyers are better off with the higher priced offering that provide some security.

Threats of alternative services

Alternative services sometimes refer to, as substitutes are existing businesses that offer the same service but do so by a different approach. When venturing into an industry it is necessary to look at what treats a business is likely to pose to similar operative in the industry in other to identify the level of profitability expected by the business. A substitute is dependent on the services offering. Our solution is a web-based information system that provides a platform for property management, social networking and information sharing. As such the businesses that are considered substitutes are businesses under the property managements & information provision segment of the industry that operate on the web. The threat posed by substitutes is low because on online-platforms, switching cost is seen to be the cost of opening a new webpage (TIM BERRY 2012). At the moment the failure of substitutes to provide suitable services to the customer provides our solution an advantage. Failures identified are further discussed in section0. Another positive side is that till date there is no business that provides a unanimous platform enabling people to share properties making our solution a proprietary service in the industry and raising the bar for new entrants. Our solution further distances itself from the substitutes by offering a seamless environment for real estate buyers and sellers as well. It offers an extensive property management environment, profile management, social networking option amongst customers enabling them to come together, buy/rent properties that are available on the market. It also provides an avenue for users to provide feedback that is used to continuously re-engineer the system.

Threats to New Entrants

According to Porter, when an industry becomes profitable, it becomes more attractive to investors and new business start to spring up in that sector (Micheal E. Porter 2008). Being

that our solution is not only an improvement over existing services also the first to offer some new service; it would enjoy the monopoly of the market for a period of time. During this time consumers would have built a relationship with the business. The trust and confidence accrued over time will discourage switching and pose difficulty to new entrants. Nigeria is a developing economy and e-commerce is yet to become very prominent giving our solution an edge. The proposed solution is one that is customer focused. It also allows for other service providers from different sectors in the industry to come in and offer their services on the solutions platform. Furthermore the handlers have the cultural inclination and understanding required to run a business in Nigeria, they have also have very strong technological background which are key requirement for innovation in the industry (Andrew Bragg & Mary Bragg 2005).

There exist some challenges that make it easier for new business to enter the market. They are the absence of a system that enforces intellectual property protection and the low cost of starting up a web-based business. In spite of the above, it is expected that our solution will continue to evolve and diversify as technology innovation transcend from on level to another so that it remains a strong competitor. One of the ways it is expected to retain its niche is that after a period of time it would have acquired reasonable amount of data and can become a strong resource for business intelligence in the industry.

Pest Factors

Political Factors

Political force includes government policies, leadership hierarchy of the area where the property is domicile, political stability, property procurement laws, and copyright Laws. On the policy front, significant challenges were posed to the market by the Land use act of 1990 (The Judiciary Federal Republic of Nigeria 1990) as has been discussed in section 2.2.5, and more challenges are envisaged from the political cadre in Nigeria. This is the case because they are presently the most trust worthy sources of information concerning properties. Political cadre authenticates information like land-lease period, certificate of ownership and they are known to have a habit of withholding information and only releasing them at exorbitant price rate (Media Rights Agenda 2000). These characteristics of policy makers and regulatory bodies make it impossible to interface with their system to acquire accurate information about properties advertised to customers. These issues, though they have severe impact on the market because it is necessary to validate the information provided to a customer, what our solution provides at the moment is an avenue for the property handlers to input these

information. They are responsible for providing that service whilst research is on-going to identify more effective ways to acquire them. It is also the expectation however, that when the system has served the nation for a number of years, trust will be established enabling the political forces to grant access to the information in their possession.

There is also the issue of businesses located in a particular area having the edge in the market because when the customer decides to proceed with the transaction they are easy to locate. This situation does not affect our solution directly because the services are strictly in the cyber-space. Also it is a system that that is not area specific, it manages properties, provides information on properties, connects realtors to customer and customers alike regardless of their location and all transaction from then on do not interface through our solution.

In terms of political stability, an unstable government usually affects the economy in most cases leading to inflation, unemployment, reduction in income and hikes in prices of goods and services (Moss 2003). A similar situation occurred recently in Nigeria, the political crisis led to the removal of fuel subsidy, this singular act took is tool on several economic segment and there was a price hike in almost everything from transportation, retail down to intangible goods and services (AKINOLA 2011). Although not much can be done about this issue, our solution operates on a flexible business model that caters for users regardless of their purchase ability. As such whether they are just getting unto the housing ladder or they have been on it and for some reason require to a few steps back, their needs are catered for.

Economic Factors

From an economic standpoint, instability in the economy will introduce the challenges that are likely to affect the market are inflation unemployment, high round-trip cost of properties, exchange rates, level of economic freedom/ economic freedom rating, higher percentage fees for realtor/middle agents, reduction in consumers disposable income. There is currently a rise in inflation rate in Nigeria part of which was caused by the removal of fuel subsidy and this has posed significant threat to overall economic growth. The statistics show that the rate of inflation at the first quarter of this year was at 12.6% compared to the 10.3% in the last quarter of 2011 (Chiakwelu 2012). High inflation rate means properties that are already highly priced now cost more and this discourages investors from investors in the economy even though there is reasonable economic freedom. And service organizations in turn charge more for their services. Information acquisition as well would cost more forcing customers to withhold demand.

There is also the issue unemployment. When the economy experiences turbulence survival strategies are initiated some of which include retrenchment. Organizations cut back on their staffing so that they can afford remuneration. In some cases they cut back salary and other benefits they used to make available to their staff. The resultant of this is a reduction in disposable income. A reduction in disposable income means less money available for housing, it becomes more difficult for people to spend money on service subscription (Internet as well as other services). The web-portal and its handlers would ensure that the service provided is reasonable priced such that even in situation like this traditional systems (manual procedures/service providers) do not outcompete it.

Social Factors

Social pressure currently posed to the market arise from lack of trust and confidence in service providers majorly because they are more interested in making profit than they are in delivering quality service to their customers. Other pressures include environmental perception (the belief about a particular area either acquired by word of mouth or the media). The media has been known to poses the power to influence any business because of wide reach to audience. Such perceptions make properties in those areas more or less attractive (Bello 2008).

Social factors that have mainly positive impact on the market are demographical changes in homebuyers, increasing dependence on technology and its ability to networking both at business and individual level. Demographic changes in homebuyers presently pose a challenge to the housing market as some of the houses are unsuitable for the customers, and when they are they are beyond their price reach. This factor only becomes a challenge to other segments of the market that are responsible for developing properties. The challenge posed to the property management segment is minimal; in that it indicates a need for varying type of housing options (Whitehead et al. 2009). Our solution has been equipped to rise above this challenge as it provides a platform that accommodates any housing option there is on the market. Demographic changes can also be seen as an added advantage ensuring consistency in transaction flow as the web portal can provide such intelligence to other segments of the market. The portal is also aligned with the trend of dependence on technology infrastructure to achieve daily task.

Technological Factors

Information technology has gained ground as a field of its own and is gradually permeating all other aspects of life and business (Apulu & Latham 2011). Integrating information technology has been successful because it has been able to provide tools that help achieve the requirement of businesses while the way in which it is applied provides competitive advantage. Its adoption has been seen in retail (e-commerce), tourism (holiday planning, scheduling and booking), education (teaching, content development and assessment) and a series of other areas. Even the government have taken it as a responsibility to enhance technology adoption in Nigeria because it has been discovered that when technology is adopted to solve a problem provides not only the service required but also the excitement (B.Idowu et al 2003) (the "WOW FACTOR" users are excited as how easy it a task that used to be tedious becomes so easy). A typical example will be the mailing system in Nigeria. Previously if a message needed to be sent, a letter is written and sent to the post office, and the expected delivery times is over 2 weeks, in some cases it doesn't even get to the destination and both parties do not know what happened to the letter. Technology innovation have made it possible to track packages as they are dispatched, it has also provided more efficient ways of getting messages across using the e-mail service. Another example is the executive dashboard system currently used in various arms of government for task scheduling, report generation and correspondence handling. Technology is a strong determinant in the market today, and it is constantly evolving so businesses that are innovative and able to keep up with the trends create a niche for themselves, becoming stronger players in their market segment. Similarly in the real estate industry, businesses are beginning to identify ways in which technology can provide them competitive advantage, improve their process as well as their service offerings. Some reluctance has been experienced with the use of technological system because of information security. Customers need assurance that by subscribing to your service they are not exposing themselves to undue risk so only businesses that are able to provide that assurance stand a chance of participating in the market in the near future.

In terms of the negative impact; technology devices run on power and increase power consumption as well as cost. The availability of electricity is still an issue in Nigeria. Availability of power determines access to the Internet. Although there are measures that have been adopted to make up for the electricity deficiency such as using generators, they are costly. This phenomenon will greatly affect businesses in the industry that a web-based by

reducing drastically their customer turnover, how often or the amount of time a customer is willing to spend on their interfaces.

There is also the issue of deficiency in technical knowhow and information security. Technology in Nigeria is still new and the skill set required to manipulate it is not readily available. Solutions that will succeed need to be tailored to suite the market. The portal is developed/managed by people with strong technological background its platforms are innovative and suited for the market as users do not require above rudimentary technology skill to use the system. The architecture provides the security required and efforts are being made to provide assurance on the information acquired from other sources. The feedback facility built in allows customers to leave their reviews. The review accumulated from the customers will be built back into the processes ensuring that at each point in time the system is at its best.

Appendix C: Information Sources in the Nigerian Real estate Industry

Home Ownership Chart

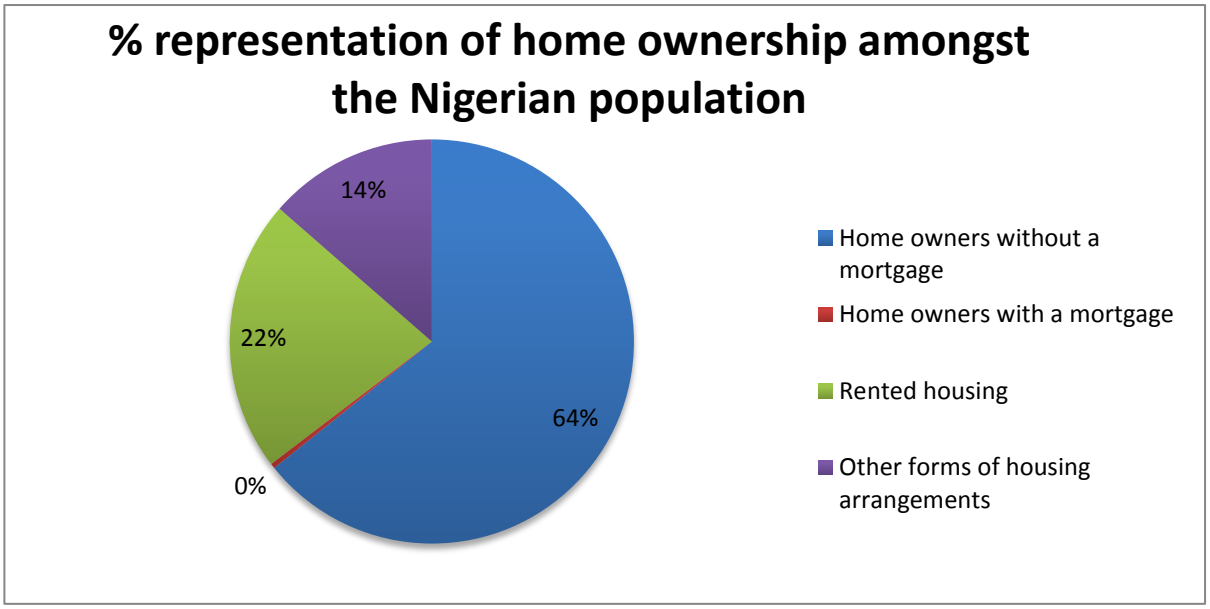


Table 6-1Home ownership chart

Sources of Real estate information, Type of information provided and relevance to the customer

Source	Function/ Services Offered	Information Type/need
REDAN	A regulatory and membership body for real estate development and developers as well. They are charged with the responsibility to coordinate the activities of private developers and ensure that professionals in the industry offer acceptable levels of service (EFInA & FinMark Trust 2010). They specify industry standards and evaluate service delivery to ensure that members live up to expectation. They are sometimes involved in conflict resolution with properties	Certification of the sources and the reliability of they provide, security certification. Environmental data
AGIS	This organization was developed for the FCT, with	Environmental Information. Validation of ownership

	a responsibility of land management, inventory and other land related issues. They work with geographical information systems to manage land and specialize in providing geo-spatial information in the federal capital territory (Abuja Geographical Information Systems 2011)	
State government office in relation to property,	Provide information on properties owned & managed by the state government	Law/policies that affect a property, behavioural pattern in the location, environmental information, local schools, local hospital, local market/stores, entertainment centres, cost, facilities available in the house (cases where the property is owned by the state government)
Area council offices,	Provide information on properties owned and managed by the Area council, properties within the area councils jurisdiction	Law/policies that affect a property, behavioural pattern in the location, environmental information, local schools, local hospital, local market/stores, entertainment centres, cost, facilities available in the house
Local government offices,	Provide information on properties owned by and managed the Local government, in the local government.	Law/policies that affect a property, behavioural pattern in the location, environmental information, local schools, local hospital, local market/stores, entertainment centres, cost, facilities available in the house (cases where the property is owned by the local government)
Property owners,	Property management, negotiation and pricing	Structural state of the house, facilities available, cost, local schools, local hospital local market/stores, entertainment centres,
Their representatives (Realtors/lawyers)	Skilled intermediary between buyers and sellers, property evaluation, contract preparation, property management, client relationship nurturing, legal advice, court representation, pricing and payment	Structural state of the house, facilities available, cost, local schools, local hospital local market/stores, entertainment centres, environmental data, Law/policies that affect a property,
The banks who are offering mortgage,	Financing information, property information in which the finance is made available for	Financing information, cost and services of a realtor
Estate surveyors and	Property evaluation to	Structural state of the house, facilities

Valuers, consultants,	determine its worth, faults and strong points	available, it's worth to help determine cost
The property owners' agent/ caretaker /friends and family of owners, the locals/ neighbours (Semi-skilled),	Correspondence, viewings, price negotiations, contracting, property management, payments	Structural state of the house, facilities available, cost, local schools, local hospital local market/stores, entertainment centres, environmental data, Law/policies that affect a property,
Real estate listing websites, Blogs and social networking sites	Property advertisement, property search, serve as an intermediary between buyers and sellers	Cost and facilities available

Table 6-2 Summary of Information sources and type of service provided

Appendix D: Real estate Type Technology within the UK Market

Improvement made in the UK (2004-2009) for real estate information delivery

- " *The introduction of the Consumer Protection from Unfair Trading Regulations Act 2008 (CPRs)*
- *The introduction of Home Information Packs (HIPs) in England and Wales and Home Reports (HRs) in Scotland*
- *Some small scale entry by low-cost, internet-based operators, and some failed attempts at entry*
- *The development of property portals as an important internet-based front end to the home buying and selling process* " (Office of Fair Trading 2010)

Technology solution in the UK's real estate market

Several technology applications have been successful in developed societies. In the UK for example, there exist property portals, online agents, the use of classified ads, the use of QR codes and also some systems built for decision support. Description is given to help understand the different technology adaptation.

QR-Codes: the QR codes which had their origin from Japan and subsequently spread to the UK and US, was an innovation designed for use with smart-phones. They are two-dimensional codes that have the capacity to store wide range of information. They have been adopted to provide real estate consumers with real-time information. The adaptation of QR codes compared other technologies seems highly promising as user will not be require internet connectivity subscription separately from that which they already have via their mobile service provider. The business model, from the perspective of revenue generation lies with the development, distribution and management of these codes.

Classified Ads: on online platform is a process of making a market. That is developing unified market platforms that connect buyers and sellers(Morgan Stanley 2002). Like traditional advertising it can be used in any business segment. As such it has been widely adopted in the sale and purchase or indication of interest for properties on the real estate market. Platforms that offer options of classified ads operate on a business model where revenue is generated from membership subscriptions, search keyword (SEO).

Online Estate Agents: these refer to computer programs that collect input preferences from users when they sign up for particular services and using their choices search databases for properties that suite their preferences. These agents though have significantly reduced the need for hiring a traditional agent to find properties, it services is limited in that it only offers first line of search. By implication the use of online agents become less functional when a user has to make choices from the previously suggested alternatives. The business model adopted is subscription.

Web-Portals: the use of web-portal in the real estate market has thrived for many years. Till date it remains the most prominent technology adaptation in the global real estate especially in developing economies like Nigeria. Webs portals are simply very robust websites that comprise of gadget application that users can use to acquire information or carry out several functions. There vary in their adaptation; in some cases they are merchant specific i.e. they are used for Company profiling and advertisements of properties they handle. In other cases they are a central platform where different players, private, public and individuals can come and advertise, connect and transact business as long as they have or need a property. Different business models are adopted in some cases a combination of two or more.

Using the services provided on the Internet to gain perspective on neighbourhoods is not new because it has been in use in some developed economies. In addition to the above, there have been several geo-demographics related information systems and/or websites developed to help people understand the environment where they are a seeking to make property investment. These systems are popularly referred to as Internet based Neighbourhood Information systems (IBNIS) (Burrows & Ellison 2005). Examples include websites such as *www.upmystreet.com* in the UK, *www.houseandhome.msn.com* in the US. Using such systems, users can search for properties in areas of choice or input certain criteria and the system makes recommendation for them as to suitable properties. Searches are conducted using the address of the area which might include a known postcode, the street, a prominent landmark e.g. University. If the user does not know the area; he/she inputs certain criteria which may include schools-rating, population, property cost, crime rate, cost of living and the system makes city comparison with statistics available on various systems with which it interacts (Burrows & Ellison 2005).

Appendix E: Needs of Stakeholders

Needs of Buyers

- Information: -buyers are in need of information about properties because this information equips them to make effective decision as to which properties would be best suited for their need. Information required is dependent on the buyer and the purpose for which they want the property. The types of information they seek vary. They search for available properties first and then all other dependencies. Examples of dependencies in this context are costs of properties, facilities available, environmental data/perception, school and hospital around an area(Bujang 2008).

- Suitable Housing Options: -buyers also need to find properties that are suitable for them. Suitability means the right type of housing at the right place and right price. When they are unable to find the above, they tend to make concession of not more than one feature(Ndubueze 2009). Examples can be seen in young workers who thought have reasonable disposable income to spend on housing are bachelors or spinsters and the housing options in their location of choice are family houses. Buyers want to have the alternative to pay for only what they need regardless of what they can afford(Office of Fair Trading 2010).

- Cost effective search: - buyers desire that when they are searching for properties, the search can be achieved with the maximum convenience possible so that they such that their decision is not influenced by the difficulty and cost surrounding the search process (O. Olatoye 2011). They want to look through all the alternatives available to them in order to ensure they are getting the best fit and at the same time want to achieve this on the smallest budget possible as the cost of the search is a different expense from actual house purchase/rent.

- Industry intelligence: - Buyers also want to have access to industry intelligence. They want to know what the property rates are, what percentages realtors are changing and how the market is changing so that they are able to better plan their investment as well as time to relocation(CABE 2011)
- Convenience Networking: -the seller-realtor- buyer relationship is on that is inevitable in the Nigerian property market (O. Olatoye 2011). Buyers understand that it is safest to have a realtor involved in the housing process because the expertise comes in handy to identify issues not visible to a common person. However they want to be able to gather knowledge

about a realtor, get a recommendation as to how well he has performed and make sure that he has the capability to protect their interest. This is the case especially when dealing with a first time buyer.

- Finance: in some cases the buyers require credit facilities to enable the purchase properties(Moss 2003). Especially when their income or budget is insufficient to cover such cost(World Bant & IFC 2011)
- Trust issues and Security: - customers require assurance that they are dealing with legitimate owners of properties and realtors(Odusote 2008). As much as they can they avoid fraudulent practises because unlike some product that can be returned is no longer desired. Houses accrue what is referred to as a round trip cost which is relatively high.(Moss 2003)

Needs of Sellers

- Highest paying tenants/buyers: - one of the key needs of a seller is to sell to the highest bidder. This is the case because the higher the cost of the property, the higher his eventual cut after all the middle men have been paid their percentages. There are situation where seller represent himself or herself so that they do not have to pay a commission to a middleman. Also the higher price-offering buyer (in cases of renting) shows that he/she is more likely to afford subsequent payments and ensure business continuity for the seller.
- Wide reach: - sellers want their properties to be able to reach the largest possible number of customers so that their chances of closing the sale at a good enough price and on time is increased(Proost 2010).
- Return on investment: - sellers always want to make sure that there is a return on their investment (World Bant & IFC 2011)i.e. after all their expenditure has been made in the product supply chain, they still have some take home profit (Agbolade 2011).
- Reduction in the number of middle men or Paying less commission: -middlemen refer to all intermediaries that are involved in the transaction between a buyer and a seller, they could be realtors (skilled or semiskilled), lawyers, and finance institutions etc. (Ojikutu et al. 2012). Sellers very much need to reduce if possible eliminate the middlemen in the supply chain. This is the case because it means more money for them; they have the opportunity to experience first-hand dynamics of the market, which will be useful for their subsequent transaction. Also there is the problem of trust of where the middleman's allegiance lies

- Industry intelligence: - this provides better understanding of the market in which the operate so sellers consider it invaluable (CABE 2011).

Needs Realtors/Estate Agents

- Closing a sale: - realtors a more often than not interested in closing a sale. I.e. concluding a transaction up till the point of handing off the keys. This is the case because the more sales they close the higher the payment (Odusote 2008). In order to achieve timely and best deal on a sale they require systems that can effectively manage their property portfolio, they require very efficient social networks/ relationships that enable them come in contact with prospective clients.

- Representing their clients and Providing guidance: - realtors want to be able to reasonably represent the interest of their clients so as to maintain a positive business relationship (O. Olatoye 2011). They also have a need to provide as accurate as possible guidance; in some occasion legal services so that their clients are able to make informed decisions.

- Reputation development:- the quality of service delivered to a previous customer /s reflects on the reputation of the realtor and his ability to gain the consumers trust (Bello 2008). Realtors understand that for demand of their service to be consistent the need to build a good reputation.

Appendix F : Statistical data on the Nigerian population

Statistics of Nigeria's urban population

Year	Total Population '000 000	% Population urban	Urban population '000 000	% Population Increase	% Urban population increase over 5 years
1985	84.9	31.8	27.00		
1990	96.69	35.3	34.13	13.89	11.01
1995	109.83	38.9	42.72	13.59	10.20
2000	124.21	42.5	52.79	13.09	9.25
2005	141.85	46.2	65.53	14.20	8.71
2010	161.6	49.8	80.48	13.92	7.79
2015	183.53	53.4	98.01	13.57	7.23
2020	207.7	56.8	117.97	13.17	6.37
2025	234.36	60.3	141.32	12.84	6.16
2030	263.63	63.6	167.67	12.49	5.47
2035	295.35	66.8	197.29	12.03	5.03
2040	329.27	69.8	229.83	11.48	4.49
2045	364.99	72.7	265.35	10.85	4.15
2050	402.43	75.4	303.43	10.26	3.71

Table 6-3 urban population statistics

Age population distribution of Nigeria

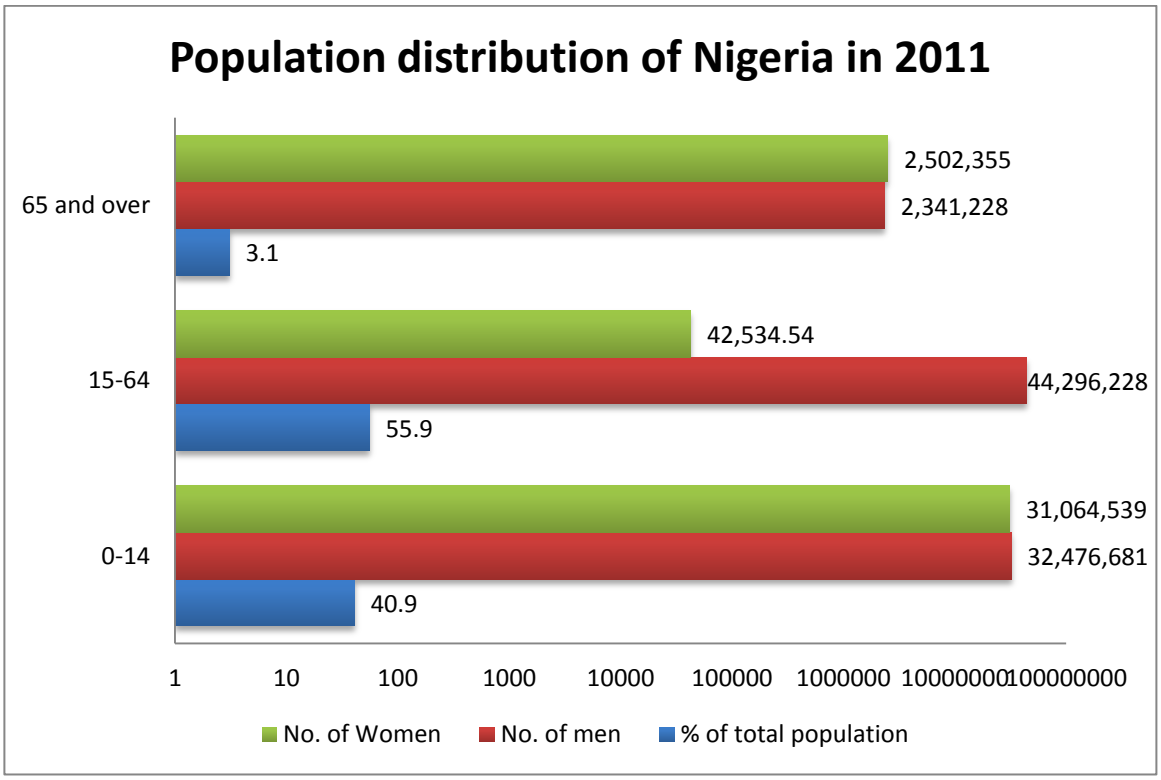


Figure 6-2Population Distribution of Nigeria. Source (US Central Intelligence Agency 2012)

Appendix G: Survey Questionnaires

Realtor's Questionnaire

As a realtor or a property owner; we are developing a system that is intended to help you serve your customers better. For this system to be suitable, we would like to get your opinion.

1. **Do you use the Internet as a media for showcasing properties you have on the market? ***
   - ○ Yes
   - ○ No
2. **What is the scale of properties you deal with? ***
   - ○ Very Large
   - ○ Large
   - ○ Intermediate
   - ○ Small
   - ○ Very small
3. **How have you come to become a realtor? ***
   - ○ Academic training and experienced
   - ○ Academic Training
   - ○ Vocational training
   - ○ Experience in property handling
   - ○ Property Owner
   - ○ Legal Entity
4. **How would you assess yourself? ***
   - ○ Highly skilled
   - ○ Skilled
   - ○ Unskilled
5. **If provided with an Internet based solution (portal), which is a collation of listings, profiles, contacts, from different realtors? Will you use this solution? ***
   - ○ Yes
   - ○ No
6. **Do you agree that such a solution will assist clients easily sort through the housing alternatives that exist? ***
   - ○ Definitely Agree
   - ○ Agree
   - ○ Disagree
   - ○ Definitely disagree
7. **How many middlemen at the minimum are involved in each property transaction? ***
   - ○ 4-6
   - ○ 1-3
   - ○ 0
8. **What percentage of property cost goes to them? ***
   - ○ 10%
   - ○ 5%
   - ○ Less Than 5%
9. **Would you prefer a web-solution that replicates the function of the middlemen? ***

- ◯ Yes
- ◯ No

10. **What do you thinks affects the usability of web-based solutions? Tick all that apply ***
    - ☐ Long user registration forms
    - ☐ Page refresh rate
    - ☐ Easy Navigation on the website
    - ☐ Absence of Technological skill
    - ☐ Preference for manual processes
    - ☐ Security of information source
    - ☐ Reputation of the information source
    - ☐ Search Flexibility (ability to conduct searches using preference criteria)
11. **In some cases, certain features introduce other barriers like cost but may still be considered a worthy trade -off. Tick 3 features that are most important to you ***
    - ☐ Robustness
    - ☐ Security
    - ☐ Detail information
    - ☐ Pictorial information
    - ☐ Usability
    - ☐ Scalability
    - ☐ System Accuracy
    - ☐ Compliance to policies

12. **Would you be willing to pay for advertisements of services you provide? ***make investments in IT and expand your business to the cyber space (internet)
    - ◯ Yes
    - ◯ No
13. **Which describes how much you spend or a willing to spend in other to open up your business to a wider customer segment Per/Month? (in NGN) ***
    - ◯ Above 100,000 Unlimited (unrestricted access)
    - ◯ 81,000 - 100,000 premium membership (max 30 properties + realtor profiling)
    - ◯ 61,000 - 80,000 Advanced membership (max 10 properties + realtor profiling)
    - ◯ 41,000 - 60,000 beginners membership (max 15)
    - ◯ 21,000 – 40,000 /5 property listing only

14. **Are there factors that hinder the success of Internet property businesses? E.g. ***
    - ☐ Anonymity of interested customers
    - ☐ Data protection
    - ☐ Loss of competitive advantage
    - ☐ Other: ☐
15. **What type of information would you want your customers to see? Select all preferred ***
    - ☐ An oversight of the property and available facilities
    - ☐ Cost of properties
    - ☐ Number of surrounding schools

- ☐ Number of entertainment centres
- ☐ Local market and shops
- ☐ Reliability of information Source based on reviews from other users
- ☐ Realtors profile
- ☐ Nearby Hospital
- ☐ Public Transport
- ☐ Good Recreational facilities
- ☐ Rural/ No neighbours
- ☐ Water frontage/Water Access
- ☐ When the property was developed
- ☐ Contract length expected

16. **What Activities do you use the Web for? ***
    - ☐ e-mail
    - ☐ Social networking
    - ☐ Business transactions
    - ☐ Office/ document processing
    - ☐ Product search
    - ☐ Shopping
    - ☐ Information and research
17. **How would you rate your IT Skill? ***
    - ○ Advanced
    - ○ Good
    - ○ Intermediate
    - ○ Beginner
    - ○ Unskilled
18. **Have you adopted ICT into your business processes? ***
    - ○ Yes
    - ○ No
19. **If yes please give a brief of what you use ICT for? ***
    - ☐ Company profiling/ information publishing
    - ☐ E-mails and Instant Messaging
    - ☐ Record keeping
    - ☐ Accounting
    - ☐ Human Resource Management
    - ☐ Property listing
    - ☐ Other: ☐
20. **As a realtor what areas have your business been improved? Select all applicable ***
    - ☐ Information dissemination
    - ☐ Property listing
    - ☐ Customer relationship

- ☐ Sale pitches
- ☐ Company profile management
- ☐ Career/ Hiring processes
- ☐ Partnerships
- ☐ Other: ☐

21. **Think of your Most preferred property website, what areas do you consider challenging, and require a solution that addresses it? ***

22. **Would you like to be involved in the evaluation stage of developing this solution and provide us with feedback? ***

- ○ Yes
- ○ No

Real estate Customer's Questionnaire

We are developing a system specifically suited for the Nigerian Real Estate Market. It is important to know what people buying properties require an online solution to achieve for them. Please take a few minutes to tell us what your preferences are

1. **In which age range do you fall into? ***
   - ◯ above 60
   - ◯ 46-60
   - ◯ 31-45
   - ◯ 16-30
   - ◯ 0-15
2. **What is the size of your family? *How many people do you provide housing for**
   - ◯ 10 and above
   - ◯ 8- 10
   - ◯ 5 - 7
   - ◯ 2 - 4
   - ◯ 1
3. **Which best describes your family? ***
   - ◯ Grand Parents
   - ◯ Old Couple
   - ◯ Young Couple
   - ◯ Newly Married
   - ◯ Single
4. **Have you purchased/rented a house before ***
   - ◯ Yes
   - ◯ No
5. **Which category best describes you? ***
   - ◯ 1st time buyer (1st housing transaction ever engaged in)
   - ◯ Repeat buyer (bought or rented more than one house)
   - ◯ Never bought or rented a house
6. **Do you use the Internet as an information media when searching for houses? ***
   - ◯ Yes
   - ◯ No
7. **What sources do you trust for real estate information? ***
   - ☐ Realtor
   - ☐ Websites
   - ☐ Social networking sites
   - ☐ Newspaper Adverts
   - ☐ Area Council offices
   - ☐ Individuals, Neighbours, family and friends
8. **How often do you change your home? ***
   - ◯ Every 11years
   - ◯ Every 6 – 10 years

- ◯ Every 2 - 5 years
- ◯ Every year
- ◯ Unscheduled

9. **What circumstance drives the need for you to change your home? ***
   - ☐ Change in job
   - ☐ Increased income
   - ☐ Reduction in income
   - ☐ Growth of the household
   - ☐ Holiday
   - ☐ Change of environment
   - ☐ Amount of time spent in a house
   - ☐ Contract term
   - ☐ Other: ☐
10. **If provided with an Internet based solution (portal), which is a collation of listings, profiles, contacts, from different realtors? Will you use this solution? ***
   - ◯ Yes
   - ◯ No
11. **Do you agree that such a solution will assist you in finding the home that is right for you? ***
   - ◯ Definitely agree
   - ◯ Agree
   - ◯ Disagree
   - ◯ Definitely disagree
12. **Would you prefer to gain an oversight of properties available on the market online before indicating an interest or visiting the location? ***
   - ◯ Yes
   - ◯ No
13. **What do you thinks affects the usability of web-based solutions? Tick all that apply ***
   - ☐ Long user registration forms
   - ☐ Page refresh rate
   - ☐ Easy Navigation on the portal
   - ☐ Absence of Technological skill
   - ☐ Preference for manual processes
   - ☐ Security of information Source
   - ☐ Reputation of the information source
   - ☐ Search Flexibility (ability to search using preference criteria)
14. **Which describes how much you spend or are willing to spend on housing information /month? (In NGN) ***
   - ◯ Above 10,000
   - ◯ 8,100 - 10,000
   - ◯ 6,100 - 8,000
   - ◯ 4,100 - 6,000
   - ◯ 2,100 – 4,000
   - ◯ 0 - 2,000

15. **If properties on the market are open for shared renting, the housing need will be greatly reduced. What percentage improvement do you think will be made ***will you be happy to use the system to look for shared renting options or buddy-up to rent a house

- ◯ Above 60%
- ◯ 51% - 60%
- ◯ 41% - 50%
- ◯ 31% - 40%
- ◯ 21% - 30%
- ◯ 10% - 20%
- ◯ Below 10%

16. **Which would be of preference when using a web solution for real estate? ***

- ☐ Viewing properties
- ☐ Contacting the realtor
- ☐ Learning about the realtor
- ☐ Posting up an ad
- Reading reviews from other users

17. **Which of the following will hinder you from using web-based information systems for real estate? Are there factors that hinder the success of Internet property businesses? ***

- ☐ Anonymity of interested customers
- ☐ Data protection
- ☐ Loss of competitive advantage
- ☐ Other: ☐

18. **How would you rate your IT Skill? ***

- ◯ Advanced
- ◯ Good
- ◯ Intermediate
- ◯ Beginner
- ◯ Unskilled

19. **Think of your most preferred Property website, what areas do you consider challenging, and require a solution that addresses it?**

*

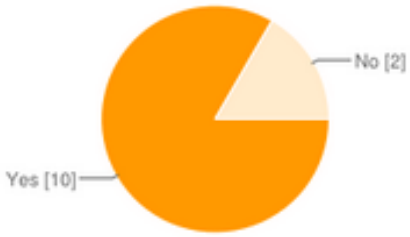
20. **Would you like to be involved in the evaluation stage of developing this solution and provide us with feedback? ***

- ◯ Yes
- ◯ No

Appendix H: Survey Questionnaire Result

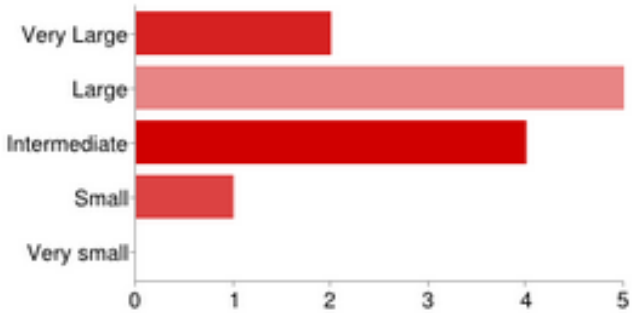
Seller/Realtor Questionnaire Result Charts

Do you use the internet as a media for showcasing properties you have on the market?



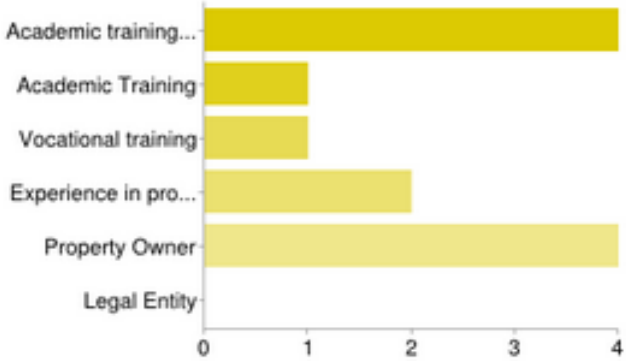
Yes	10	83%
No	2	17%

What is the scale of properties you deal with?



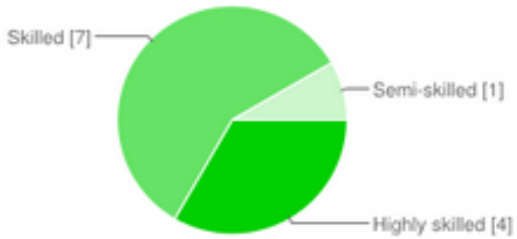
Very Large	2	17%
Large	5	42%
Intermediate	4	33%
Small	1	8%
Very small	0	0%

How have you come to become a realtor?



Academic training & experienced	4	33%
Academic Training	1	8%
Vocational training	1	8%
Experience in property handling	2	17%
Property Owner	4	33%
Legal Entity	0	0%

How would you assess yourself?

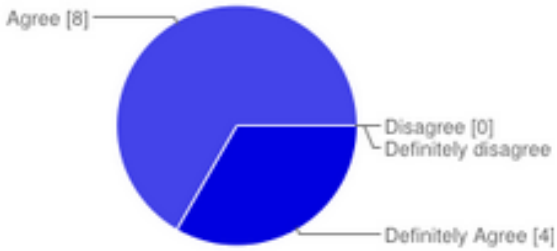


Highly skilled	4	33%
Skilled	7	58%
Semi-skilled	1	8%

If provided with an internet based solution (portal), which is a collation of listings, profiles, contacts, from different realtors? Will you use this solution?

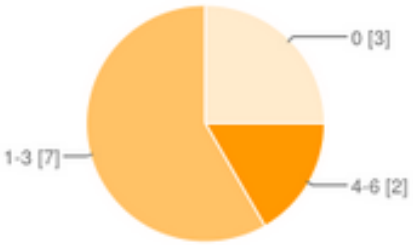
Yes	12	100%
No	0	0%

Do you agree that such a solution will assist clients easily sort through the housing alternatives that exist?



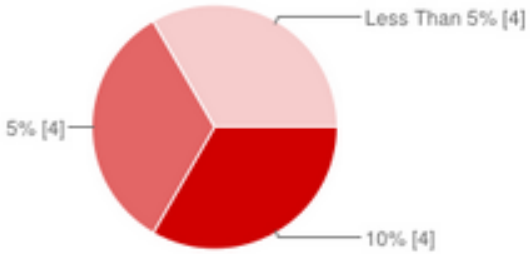
Definitely Agree	4	33%
Agree	8	67%
Disagree	0	0%
Definitely disagree	0	0%

How many middle-men at the minimum are involved in each property transaction?



4-6	2	17%
1-3	7	58%
0	3	25%

What percentage of property cost goes to them?

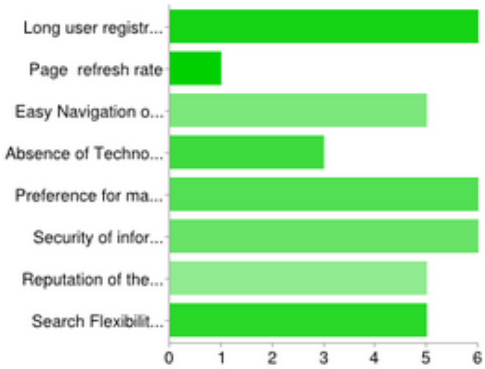


10%	4	33%
5%	4	33%
Less Than 5%	4	33%

Would you prefer a web-solution that replicates the function of the middle men?

Yes	10	83%
No	2	17%

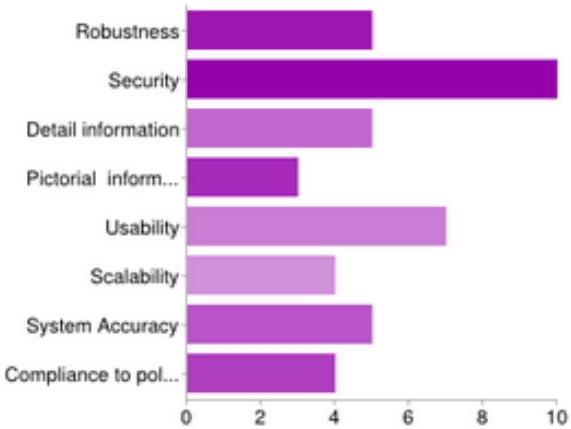
What do you thinks affects the usability of web based solutions? Tick all that apply



Long user registration forms	6	50%
Page refresh rate	1	8%
Easy Navigation on the website	5	42%
Absence of Technological skill	3	25%
Preference for manual processes	6	50%
Security of information source	6	50%
Reputation of the information source	5	42%
Search Flexibility (ability to conduct searches using preference criteria)	5	42%

People may select more than one checkbox, so percentages may add up to more than 100%.

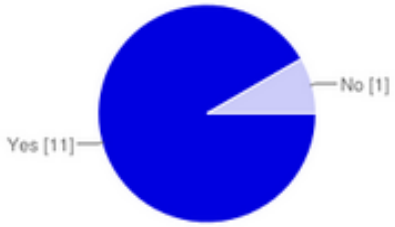
In some cases, certain features introduce other barriers like cost but may still be considered a worthy trade -off. Tick 3 features that are most important to you?



Robustness	5	42%
Security	10	83%
Detail information	5	42%
Pictorial information	3	25%
Usability	7	58%
Scalability	4	33%
System Accuracy	5	42%
Compliance to policies	4	33%

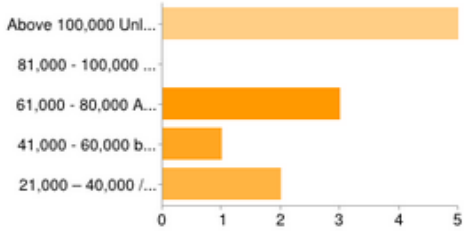
People may select more than one checkbox, so percentages may add up to more than 100%.

Would you be willing to pay for advertisements of services you provide?



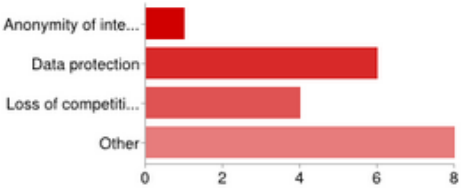
Yes	11	92%
No	1	8%

Which describes how much you spend or a willing to spend in other to open up your business to a wider customer segment Per/Month? (in NGN)



Above 100,000 Unlimited (unrestricted access)	5	42%
81,000 - 100,000 premium membership (max 30 properties + realtor profiling)	0	0%
61,000 - 80,000 Advanced membership (max 10 properties + realtor profiling)	3	25%
41,000 - 60,000 beginners membership (max 15)	1	8%
21,000 – 40,000 /5 property listing only	2	17%

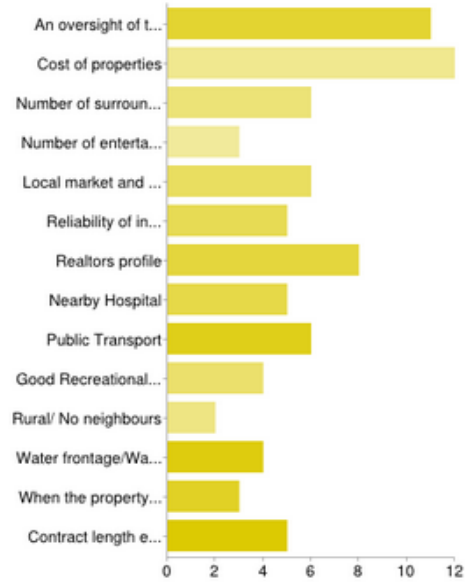
Are there factors that hinder the success of internet property businesses? E.g.



Anonymity of interested customers	1	8%
Data protection	6	50%
Loss of competitive advantage	4	33%
Other	8	67%

People may select more than one checkbox, so percentages may add up to more than 100%.

What type of information would you want your customers to see? Select all preferred



An oversight of the property and available facilities	11	92%
Cost of properties	12	100%
Number of surrounding schools	6	50%
Number of entertainment centres	3	25%
Local market and shops	6	50%
Reliability of information Source based on reviews from other users	5	42%
Realtors profile	8	67%
Nearby Hospital	5	42%
Public Transport	6	50%
Good Recreational facilities	4	33%
Rural/ No neighbours	2	17%
Water frontage/Water Access	4	33%
When the property was developed	3	25%
Contract length expected	5	42%

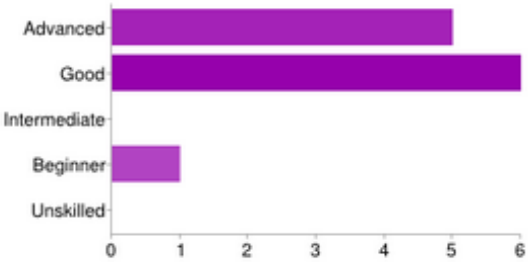
People may select more than one checkbox, so percentages may add up to more than 100%.

What Activities do you use the Web for?

e-mail	12	100%
social networking	9	75%
business transactions	7	58%
office/ document processing	4	33%
product search	6	50%
shopping	2	17%
information & research	10	83%

People may select more than one checkbox, so percentages may add up to more than 100%.

How would you rate your IT Skill?



Advanced	5	42%
Good	6	50%
Intermediate	0	0%
Beginner	1	8%
Unskilled	0	0%

Have you adopted ICT into your business processes?

Yes	8	67%
No	4	33%

If yes please give a brief of what you use ICT for?

Company profiling/ information publishing	6	50%
E-mails & Instant Messaging	11	92%
Record keeping	5	42%
Accounting	1	8%
Human Resource Management	2	17%
Property listing	5	42%
Other	1	8%

People may select more than one checkbox, so percentages may add up to more than 100%.

As a realtor What areas have your business been improved? Select all applicable

Information dissemination	9	75%
Property listing	8	67%
Customer relationship	8	67%
Sale pitches	7	58%
Company profile management	6	50%
Career/ Hiring processes	4	33%
Partnerships	5	42%
Other	2	17%

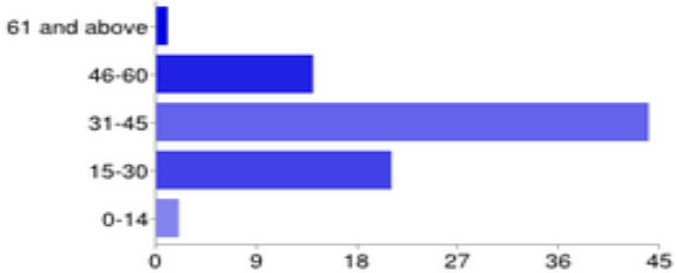
People may select more than one checkbox, so percentages may add up to more than 100%.

Would you like to be involved in the evaluation stage of developing this solution and provide us with feedback?

Yes	11	92%
No	1	8%

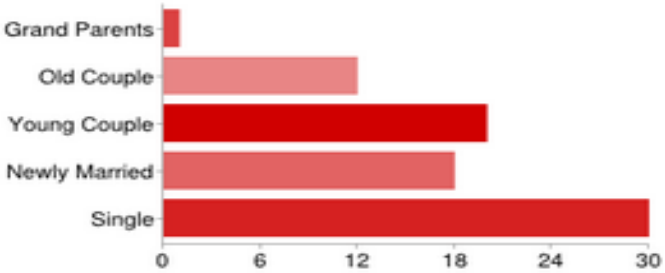
<u>Buyers Questionnaire Result Charts</u>

In which age range do you fall into?



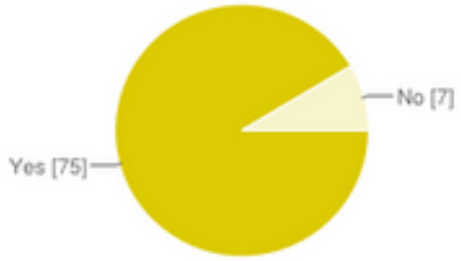
61 and above	1	1%
46-60	14	17%
31-45	44	54%
15-30	21	26%
0-14	2	2%

Which best describes your family?



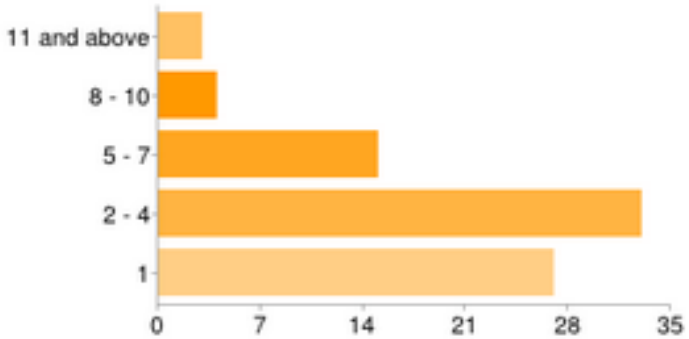
Grand Parents	1	1%
Old Couple	12	15%
Young Couple	20	24%
Newly Married	18	22%
Single	30	37%

Have you purchased/rented a house before



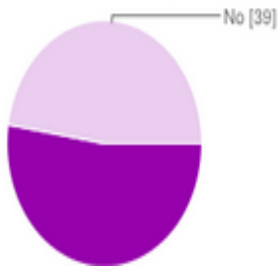
Yes	**75**	91%
No	**7**	9%

What is the size of your family?



11 and above	**3**	4%
8 - 10	**4**	5%
5 - 7	**15**	18%
2 - 4	**33**	40%
1	**27**	33%

Do you use the internet as an information media when searching for houses?



Yes	**43**	52%
No	**39**	48%

Which category best describes you?

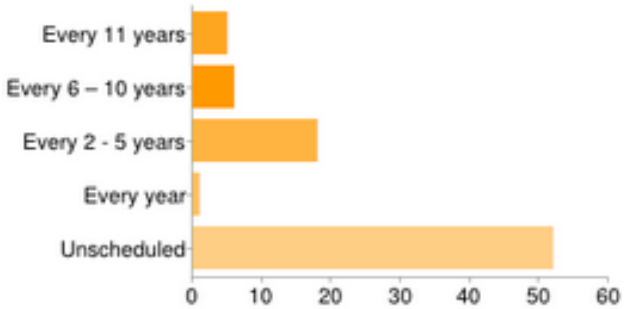
1st time buyer (1st housing transaction ever engaged in)	**30**	37%
Repeat buyer (bought or rented more than one house)	**45**	55%
Never bought or rented a house	**7**	9%

What sources do you trust for real estate information?

Realtor	36	44%
Websites	22	27%
Social networking sites	9	11%
Newspaper Adverts	22	27%
Area Council offices	14	17%
Individuals, Neighbours, family & friends	55	67%

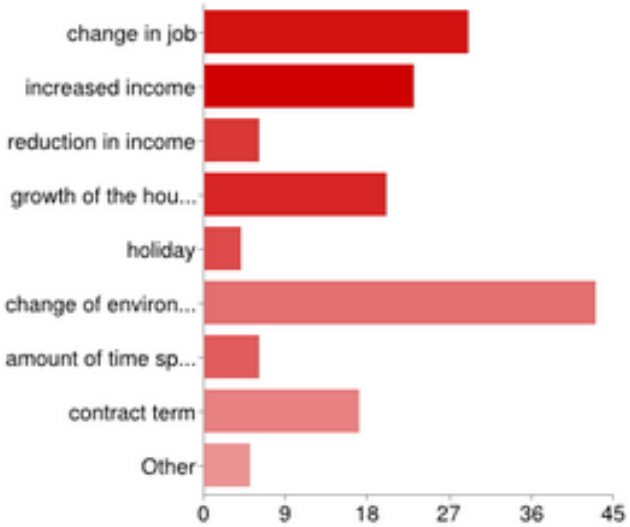
People may select more than one checkbox, so percentages may add up to more than 100%.

How often do you change your home?



Every 11 years	5	6%
Every 6 – 10 years	6	7%
Every 2 - 5 years	18	22%
Every year	1	1%
Unscheduled	52	63%

What circumstance drives the need for you to change your home?



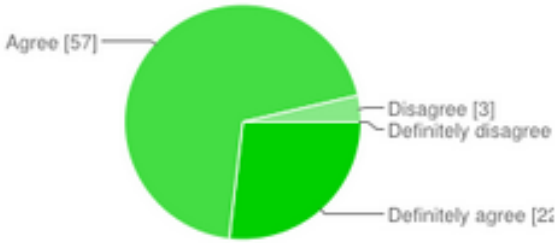
change in job	29	35%
increased income	23	28%
reduction in income	6	7%
growth of the household	20	24%
holiday	4	5%
change of environment	43	52%
amount of time spent in a house	6	7%
contract term	17	21%
Other	5	6%

People may select more than one checkbox, so percentages may add up to more than 100%.

If provided with an internet based solution (portal), which is a collation of listings, profiles, contacts, from different realtors? Will you use this solution?

Yes	80	98%
No	2	2%

Do you agree that such a solution will assist you in finding the home that is right for you?

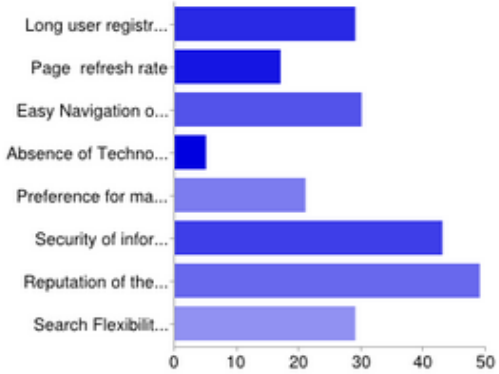


Definitely agree	22	27%
Agree	57	70%
Disagree	3	4%
Definitely disagree	0	0%

Would you prefer to gain an oversight of properties available on the market online before indicating an interest or visiting the location?

Yes	80	98%
No	2	2%

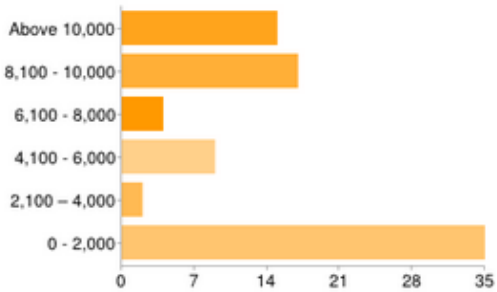
What do you thinks affects the usability of web based solutions? Tick all that apply



Long user registration forms	29	35%
Page refresh rate	17	21%
Easy Navigation on the portal	30	37%
Absence of Technological skill	5	6%
Preference for manual processes	21	26%
Security of information Source	43	52%
Reputation of the information source	49	60%
Search Flexibility (ability to search using preferrence criteria)	29	35%

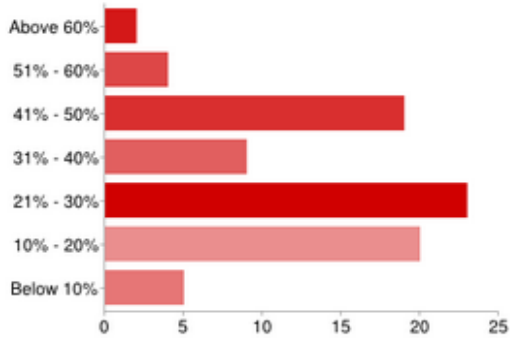
People may select more than one checkbox, so percentages may add up to more than 100%.

Which describes how much you spend or are willing to spend on housing information /month ? (in NGN)



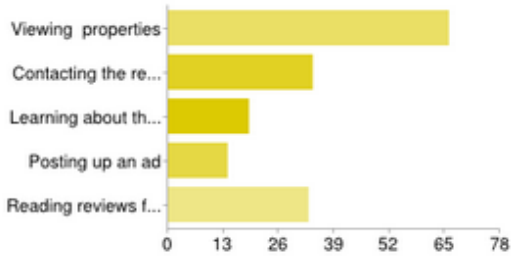
Above 10,000	15	18%
8,100 - 10,000	17	21%
6,100 - 8,000	4	5%
4,100 - 6,000	9	11%
2,100 – 4,000	2	2%
0 - 2,000	35	43%

If properties on the market are open for shared renting, the housing need will be greatly reduced. what percentage improvement do you think will be made



Above 60%	2	2%
51% - 60%	4	5%
41% - 50%	19	23%
31% - 40%	9	11%
21% - 30%	23	28%
10% - 20%	20	24%
Below 10%	5	6%

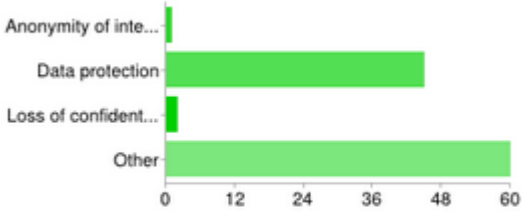
Which would be of preference when using a web solution for real estate?



Viewing properties	66	81%
Contacting the realtor	34	42%
Learning about the realtor	19	23%
Posting up an ad	14	17%
Reading reviews from other users	33	41%

People may select more than one checkbox, so percentages may add up to more than 100%.

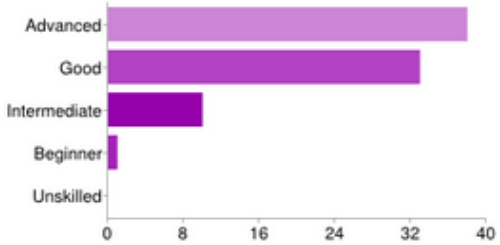
Which of these factors is likely to hinder your use of web-based real-estate information systems



Anonymity of interested customers	1	1%
Data protection	45	56%
Loss of confidentiality	2	2%
Other	60	74%

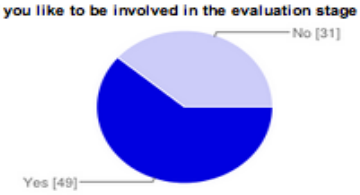
People may select more than one checkbox, so percentages may add up to more than 100%.

How would you rate your IT Skill?



Advanced	38	46%
Good	33	40%
Intermediate	10	12%
Beginner	1	1%
Unskilled	0	0%

Would you like to be involved in the evaluation stage of developing this solution and provide us with feedback?



Yes	49	60%
No	31	38%

Appendix I: Transcribed Interview

Question 1: What information can you provide about trends in the real estate market?

The post global financial crisis real estate market is very lucrative; it has managed to grow even amidst the poor management. Financial crisis has shifted concern to areas, which were previously neglected sectors like real estate. Fortunately Nigeria large population there will be a constant demand for housing. The bandwagon[7] culture in Nigeria has also contributed to the success of the market. Similar development was experienced when the capital market was thrived; many people made very huge investments in the capital market and they profited from this venture except the success was short-lived as the market soon crumbled. With real estate however there is some promise of profit longevity especially because Nigerians believe in property ownership. From the lowest Nigerian to the most buoyant, property ownership is highly essential; so the rush into investing in real estate will hopefully be less tragic.

For the realtors however, and other business relating to properties; numbers are critical to succeeding in Nigeria. The high population in the countries provided opportunities to serve a variation of customers who also have varying needs. In Nigeria, realtors and homeowners/developers hope to make approximately 300% profit. This type of profit margin is only possible when development is focused to meet the upper-end customers on the market, which in Lagos; of the over 20million people accounts for less than 100 thousand. If these divide is so obvious in a city like Lagos that help you imagine what happens in the country at large. Such situations neither severs the Nigerian customer, nor allow the market grow, as it should.

Question 2: what typical activities do you engage in on a daily basis as a realtor?

Activities I engage in a numerous. They range from sending promotional emails, make calls to follow-up clients who have been contacted regarding the properties the company manages, going around sites to inspect properties in order to ensure that they are in good condition, when something goes bad depending on the level of damage, we schedule appointment with contractors or individuals to have it fixed as long as it is

[7] Bandwagon: - individual decisions and action is driven by the majority opinion or action (Sonck & Loosveldt 2010)

covered by concerned contracts. If we have been contacted about interest in any of our properties, or have scheduled a viewing. We take the customer to site let them see the property, have a feel of it and then further discussion carry on from there. They would also have the opportunity to see similar properties we manage that are within their budget.

For our existing customers, at appropriate dates we send out reminder about their payments (rent/mortgage); and where necessary we receive payments on behalf of our clients. Our services offered to existing companies clients include, going through a series of offices to do document verification, even more so when the company does not manage the property under consideration. Another core function is the pitching of sales and enlisting properties in the newspapers or popular magazines. To do that, a subscription fee is paid and the information that you desire to publish is developed and sent to the media house either by e-mail or post. Sometimes, we drive through a neighbourhood in search of business. That is if any new properties were being developed, we would endeavour to get in touch with the developers or owners to know if they have hired a realtor to manage it, and then offer them my services so that they have options.

At certain times, if development is being done by a parastatals or financial institution, the put out an request for proposal (RFP) then realtors and contractors alike would be required to develop bid documents in an attempt to get the job.

Question 3: of all these activities which ones do you use the Internet for?

Well just sending mails, managing the companies profile and some research while developing our RFP's

Question 4:-What activities would you like to use the internet for?

The thing about using the Internet is on consistency. Two very interesting websites are www.jidetaiwo&co.com, propertywatch.com. However is the opinion that there is still lack of consistency. We would like to see Available properties online, more information on the properties (elaborate detail of property e.g. pictures), be able to judge the security and authenticity of information source. The area considered most challenging is the fact most times client request for a particular kind of property in a specific location and you will search to no avail without getting anything, transaction

of business is also sometimes difficult on online platforms because you do not know your customers. We would also like the site to be more active and accessible by realtors outside the organization.

Question 5:- Would you be willing to pay a subscription fee for a service that provides some or maybe all of the capabilities you require? And what is your maximum possible spend?

Yes we would be willing to pay for it, especially if it solves all the identified problems. However on the issue of maximum spend, it is dependent on what the service charge is and if it is open for bargain.

Question 6:- Do you think it will affect the company's competitiveness on the market?

Honestly, not really. This is the case because we normally do our best to get information across to as many people as possible, and there no telling who is a realtor and who is not. Secondly, it is advantageous for other realtors to know what properties you have on the market just in case they have customers who they have been unable to find properties for and your own properties suit their need.

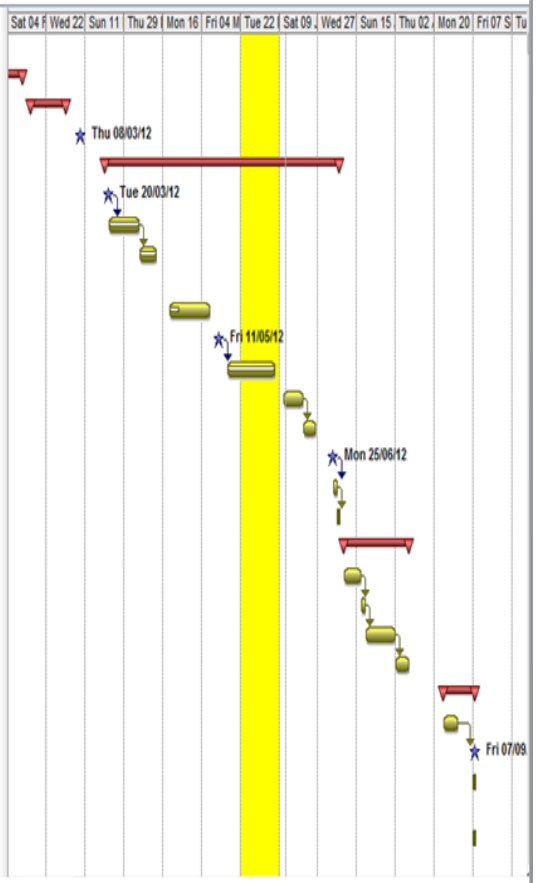
Competitiveness in our own opinion as a company is a function of performance. Good performance makes your customers trust you to protect their interest. So they will hire you to handle their real estate transactions and even recommend you to other. So competiveness is not an issue but performance. How do customers differentiate the performance of one realtor to another? You mentioned that the solution in question provides an opportunity for customers who have been served to write reviews about the realtor. This would be a very welcome development.

Appendix J : Project Plan

M.Sc. Project Plan- Application of technology in business: Developing a Web-Based Real- Estate Information system for Decision Support in Nigeria By

Chukwuemeka, Chidinma U. STUDENT ID: 7995669

	Task Name	Duration	Start	Finish	% Comp.
1	Ist meeting with supervisor	1 day	Mon 30/01/12	Mon 30/01/12	100%
2	Projecct Initiation Phase	8 days	Wed 01/02/12	Fri 10/02/12	100%
5	Project scope, aim & Definition	12 days	Wed 15/02/12	Thu 01/03/12	100%
11	Submit Project Plan	1 day	Thu 08/03/12	Thu 08/03/12	100%
12	Project Execution Phase	60 days	Tue 20/03/12	Fri 06/07/12	42%
13	Build a business case for project	2 days	Tue 20/03/12	Wed 21/03/12	100%
14	Literature Review	10 days	Thu 22/03/12	Wed 04/04/12	100%
15	clearification of constraints, limitation or restriction on research area with university research team	6 days	Thu 05/04/12	Thu 12/04/12	100%
16	Begin development of web pages	13 days	Thu 19/04/12	Mon 07/05/12	20%
17	Submission of progress report	1 day	Fri 11/05/12	Fri 11/05/12	100%
18	Exam Period	1 day	Wed 16/05/12	Wed 06/06/12	100%
19	Develop SQL database to suport the site-backend	7 days	Mon 11/06/12	Tue 19/06/12	0%
20	write script to interface website with Google places API	4 days	Wed 20/06/12	Mon 25/06/12	0%
21	Working Prototype of the portal deployed	7 days	Mon 25/06/12	Tue 03/07/12	0%
22	Evaluation and risk assesment	2 days	Wed 04/07/12	Thu 05/07/12	0%
23	Documentation review	1 day	Fri 06/07/12	Fri 06/07/12	0%
24	Project Performance & Control	22 days	Mon 09/07/12	Tue 07/08/12	0%
25	Compare project status with expected goals and deliverables	6 days	Mon 09/07/12	Mon 16/07/12	0%
26	Deploy working dash-board component & Improvemnts if necessary	2 days	Tue 17/07/12	Wed 18/07/12	0%
27	preparation of final project document	10 days	Thu 19/07/12	Wed 01/08/12	0%
28	document review/ draft submission to supervisor	4 days	Thu 02/08/12	Tue 07/08/12	0%
29	Project Close	11 days	Fri 24/08/12	Fri 07/09/12	0%
30	Identify areas necessary for further research	5 days	Fri 24/08/12	Thu 30/08/12	0%
31	Submit final copy of dissertation	1 day	Fri 07/09/12	Fri 07/09/12	0%
32	Submit fail-prof copy of prototype/algorithm/recommendations for implementation	1 day	Fri 07/09/12	Fri 07/09/12	0%
33	exit	1 day	Fri 07/09/12	Fri 07/09/12	0%



Project: Project Plan abriged
Date: Tue 12/06/12

Task | Milestone | Rolled Up Task | Rolled Up Progress | External Tasks | Group By Summary
Progress | Summary | Rolled Up Milestone | Split | Project Summary | Deadline

Figure 6-3 Project implementation plan

Appendix K: Website Screen Shots

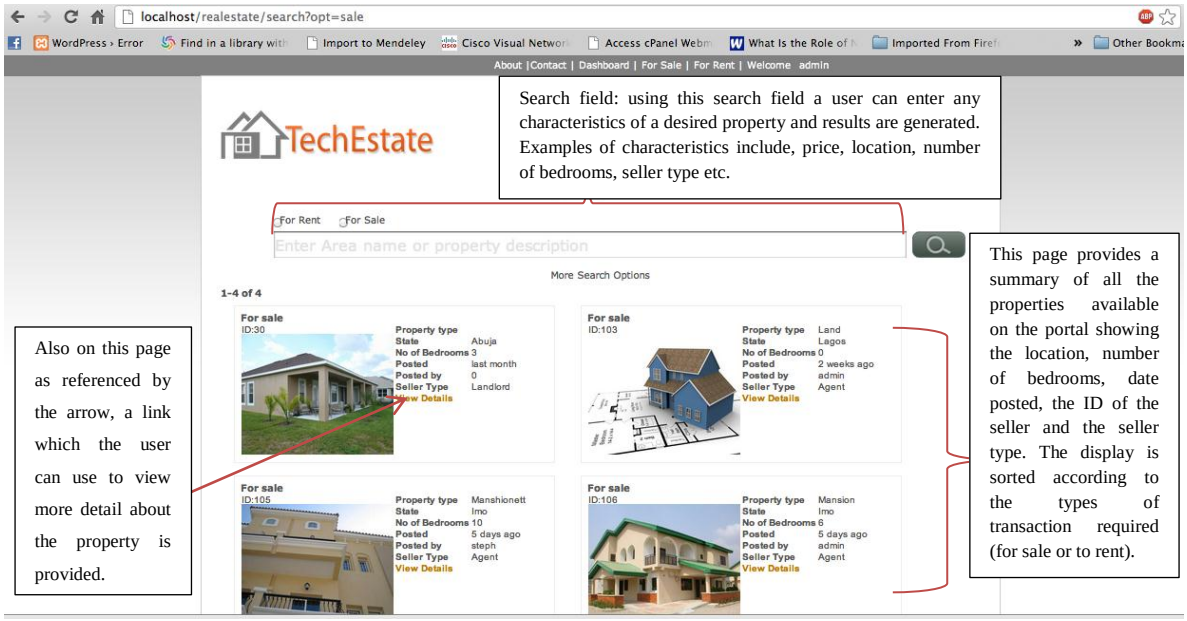


Figure 6-4 Property display page

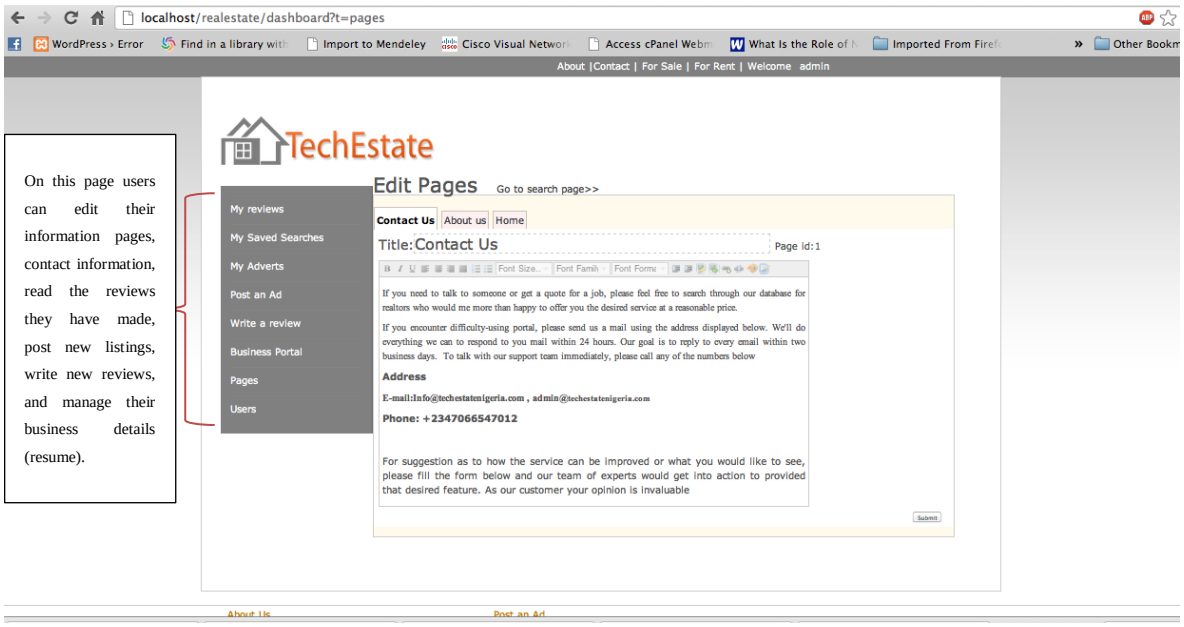


Figure 6-5 portfolio management section

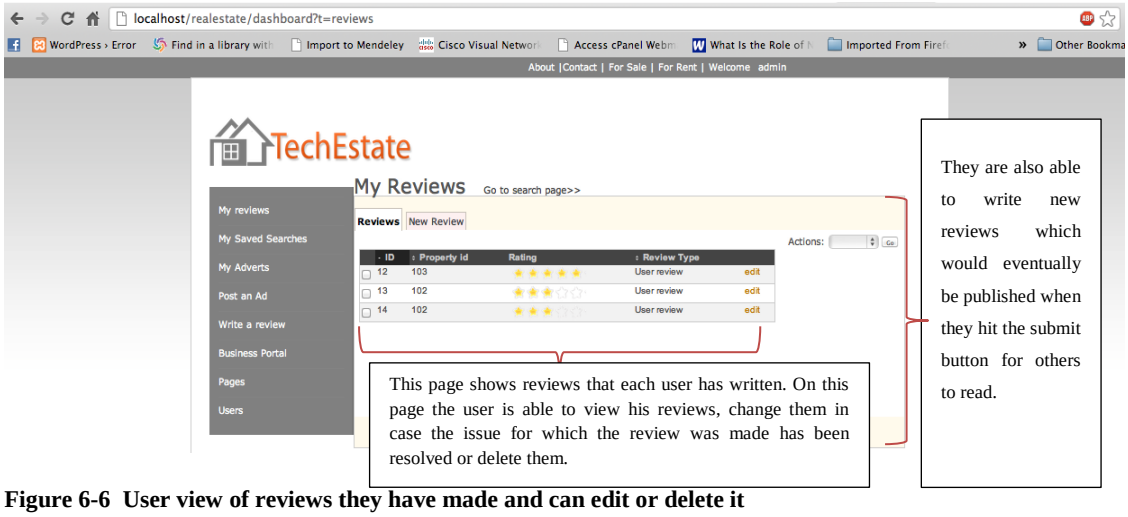


Figure 6-6 User view of reviews they have made and can edit or delete it

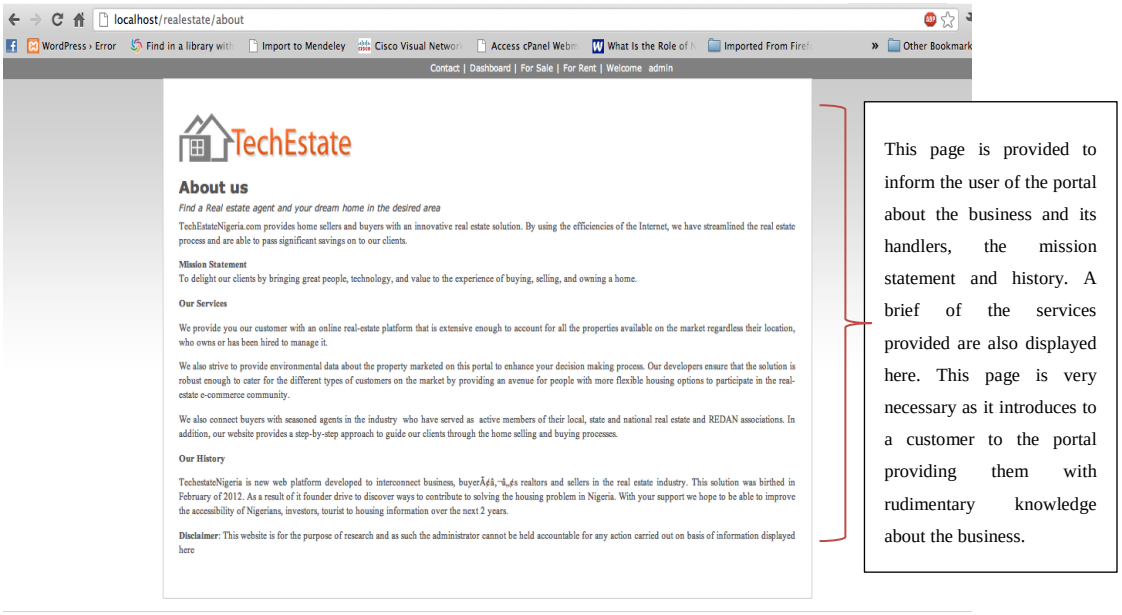


Figure 6-7 Company Information page

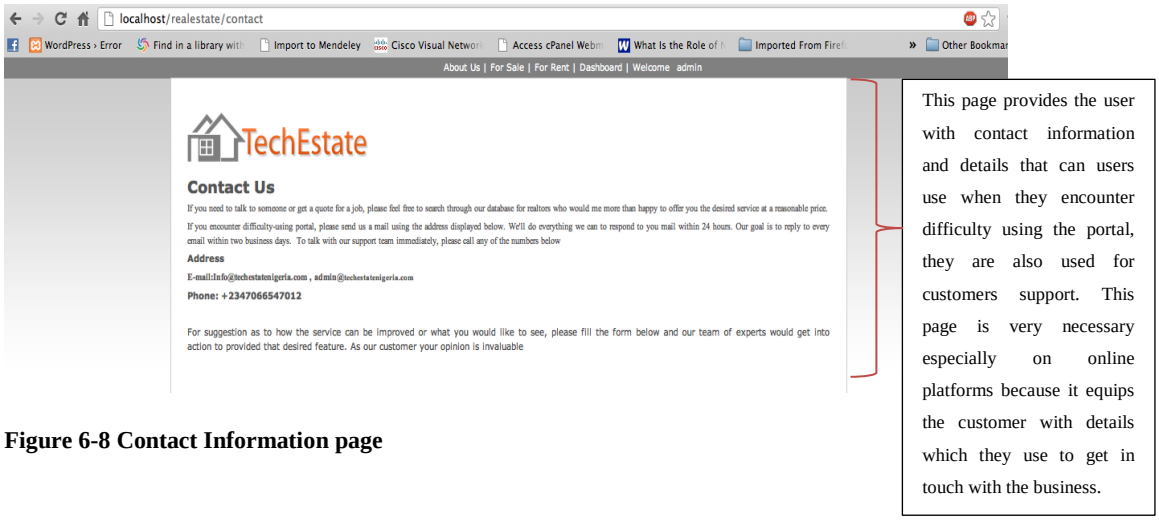


Figure 6-8 Contact Information page

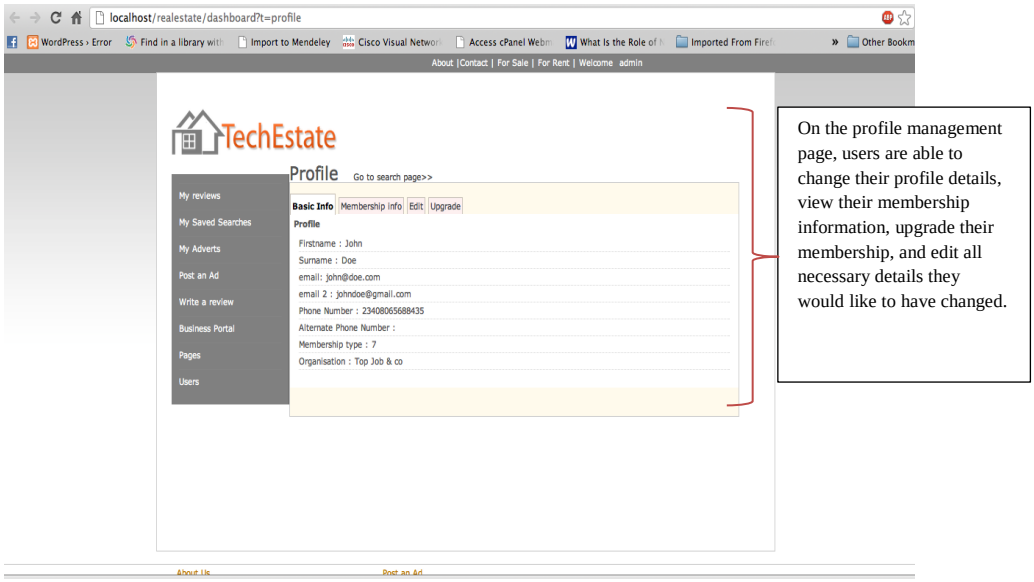


Figure 6-9 Profile Management section

This is the link to the developed web application: http://www.techestatenigeria.com/

This dissertation is also accompanied with a compact disk (CD) that contains the source code of the web application.

Appendix L :- Expenditure and Revenue generation Breakdown

	Expenditure		Income
	Initial Acquisition / developmental cost	**Operational cost**	
Requirement gathering	20,000.00		
Company registration	90,000.00		
Document Processing fee	20,000.00		
Tax payers registration	No charge		
Software development	100,000.00		
Software testing	10,000.00		
Domain Name purchase	40,000.00		
Service subscription			100,000 P/A
Advertisements		50,000.00	
Staff recruitment		100,000.00 P/A	
Site Maintenance		50,000.00	
Property owner registration			10,000 P/A individual 100,000 P/A corporations
Realtor registration			10,000 P/A
Property listing			2% -10% of total cost or alternatively Above 100,000 Unlimited (unrestricted access) 81,000 - 100,000 premium membership (max 30 properties + realtor profiling) 61,000 - 80,000 Advanced membership (max 10 properties + realtor profiling) 41,000 - 60,000 beginners membership (max 15) 21,000 – 40,000 /5 property listing only
Miscellaneous expenses		100,000.00	

Table 6-4Table showing the estimated cash flow in and out of the business(International Finance Corpration & The World Bank 2012)

Appendix M :- Code Igniter framework flowchart

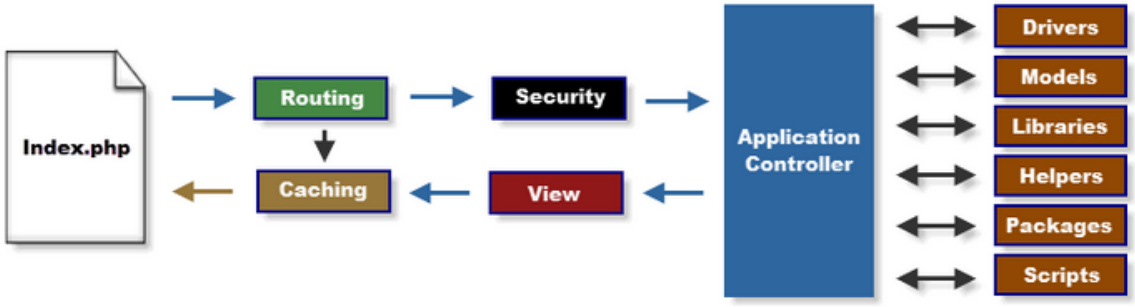


Figure 6-10 Code Igniter Framework Flowchart (www.codeigniter.com 2012)